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TREASURE VALLEY HIGH CAPACITY TRANSIT STUDY PRIORITY CORRIDOR PHASE 1 ALTERNATIVES ANALYSIS

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1.0 Background

The Treasure Valley High Capacity Transit Study includes three major elements, the downtown multimodal center site selection and NEPA analysis, identification of an alignment and mode for a downtown circulator and phase 1 of an alternatives analysis (AA) for the Treasure Valley Corridor. This report describes the analysis and findings of phase 1 of the AA.

The Treasure Valley Corridor includes transportation routes roughly paralleling I-84 and the Boise Cutoff rail alignment connecting central Boise with Meridian, Nampa and Caldwell. Initial interest in exploring transit opportunities in this broad travel corridor focused on the ability to utilize the Boise Cutoff rail alignment to provide regularly scheduled transit service that would meet the transportation needs of valley commuters. In order to meet Federal Transit Administration (FTA) requirements for an AA, this analysis also examined other alignments and modes that could be available to provide high-capacity transit (HCT) service to the valley commuter market.

This report provides background information on current and projected transportation demand in the corridor, describes the demographic context of the corridor, describes the range of potential HCT modes that could be considered to serve the corridor, evaluates potential modes and alignments to serve the corridor and provides recommendations on the most promising HCT alternatives to study in more detail in the next phase of the alternatives analysis.

1.1 History

Rapid Growth and Low Density

The Treasure Valley region is characterized by rapid growth and a low density auto-oriented development pattern. The Treasure Valley region is made up of Ada County, which includes Boise and Meridian, and Canyon County, which includes Nampa and Caldwell. Census data shows that the region grew very rapidly between 1990 and 2000 with both Ada and Canyon Counties growing by 46 percent for a total growth of over 136,000.

Between 2000 and 2007 the rapid population growth continued, with the region adding over 120,000 new residents. The cities of Caldwell and Meridian grew over 200 percent. Table 1-1 shows the change in population between

2000 and 2007 for both counties. As the table shows, both counties grew rapidly between 2000 and 2007 with total growth of 28 percent. Ada County has added more new residents between 2000 and 2007. However, the largest percentage growth rate occurred in Canyon County, with 36% growth.

Table 1-1: 2000 and 2007 Population Data by County

	2000 Population	2007 Population	Change in Population, 2000-2007	Percent Change in Population, 2000-2007
Ada County	300,904	373,406	72,502	+24%
Canyon County	131,441	179,381	47,940	+36%
TOTAL	432,345	552,787	120,442	+28%

Source: American Community Survey 2007, Table B01003

An economic downturn occurred after the 2007 data was recorded. This downturn led to slower growth rates between 2007 and 2009. This slow growth is expected to be temporary and it is anticipated that when the economy recovers, growth rates would be similar to historic growth rates.

While some growth is occurring in the central cities, the majority of it is occurring in new suburban parts of the region which, by nature, do not lend themselves easily to high-density or high-capacity transit service. The highest growth rates in the region are projected to occur in Meridian, Nampa, and Caldwell.

The Boise Cutoff

The Boise Cutoff Railroad is a branch line that diverges from the Union Pacific Railroad (UPRR) main line in Nampa and continues east to the Boise Depot, approximately one mile south of downtown Boise. It then turns southeast and rejoins the UPRR line. Over the years there has been considerable interest in using the Boise Cutoff between Nampa and the Boise Depot to provide regularly scheduled passenger rail service connecting the cities in the valley. In 1997 a RegioSprinter self-propelled passenger rail car was operated as a demonstration service between the Boise Depot and the Idaho Center. Interest in rail transit utilizing the Boise Cutoff resulted in the *Rail Corridor Evaluation Study*, April 2003. This report examined the right-of-way availability and the issues associated with running transit service on this existing freight rail alignment. The study included an initial operating plan and rough cost estimates.

Local Planning Context

The Treasure Valley encompasses the metropolitan area for the greater Boise region including Ada and Canyon counties and the cities of Boise, Meridian, Nampa, and Caldwell. Each city and county within the region has an adopted comprehensive plan and unique transportation and growth management plans. Long-range regional transportation planning is provided by the Community Planning Association of Southwest Idaho (COMPASS). Transit service in both counties is provided by Valley Regional Transit (VRT).

The Idaho Transportation Department (ITD) operates and maintains all interstate and designated state highways in the study corridor. All non-state roadways within Ada County (including incorporated and unincorporated areas) are under the jurisdiction of the Ada County Highway District (ACHD). Canyon County has four highway districts that cover unincorporated areas of the county. All non-interstate roadways within the unincorporated portions of the county are governed by the applicable highway district. The cities of Nampa and Caldwell operate and maintain all non-state roadways within their city limits.

1.2 Federal Transit Administration Process

Developing a high-capacity transit system to serve the valley will require funding from federal, state and local sources. Most significant HCT systems developed in the United States in the past 30 years have been done in partnership with the Federal Transit Administration. One of the goals of this Phase 1 Alternatives Analysis is to position the corridor to potentially compete for federal funding through FTA's New Starts program. New Starts is a transit capital grant program overseen by FTA to provide capital grants to meritorious transit projects throughout the country.

New Starts (Section 5309)

The New Starts program was established by Congress to assist local agencies to fund transit capital projects (including light rail, commuter rail and bus rapid transit). New Starts is a discretionary and competitive grant program and over the years FTA has established guidance for applications that include extensive requirements regarding system planning, alternatives analysis and technical analysis. The FTA process is aimed at demonstrating the merits of the various projects and providing data and analysis with which to compare competing projects from across the country.

FTA requires that a proposed transit corridor be included in the regional transportation plan and that the local project sponsor perform a comprehensive alternatives analysis in the corridor. While an AA is a locally directed study, FTA provides clear guidance on the analysis and methods. FTA staff presents AA training several times per year at different locations so that sponsoring agencies and consultants can stay current on FTA's preferred analysis methods.

Figure 1-1 below displays the FTA project development process. The first step in the process is the System Planning phase where the evaluation uses data on regional travel patterns and transportation problems to identify priority corridors. The system plan step is addressed through COMPASS' *Communities in Motion* regional transportation plan which identified high-capacity transit service along the Boise Cutoff rail alignment as an opportunity to provide an effective transit alternative to I-84 and other congested east-west roadways serving the valley.

Alternatives Analysis

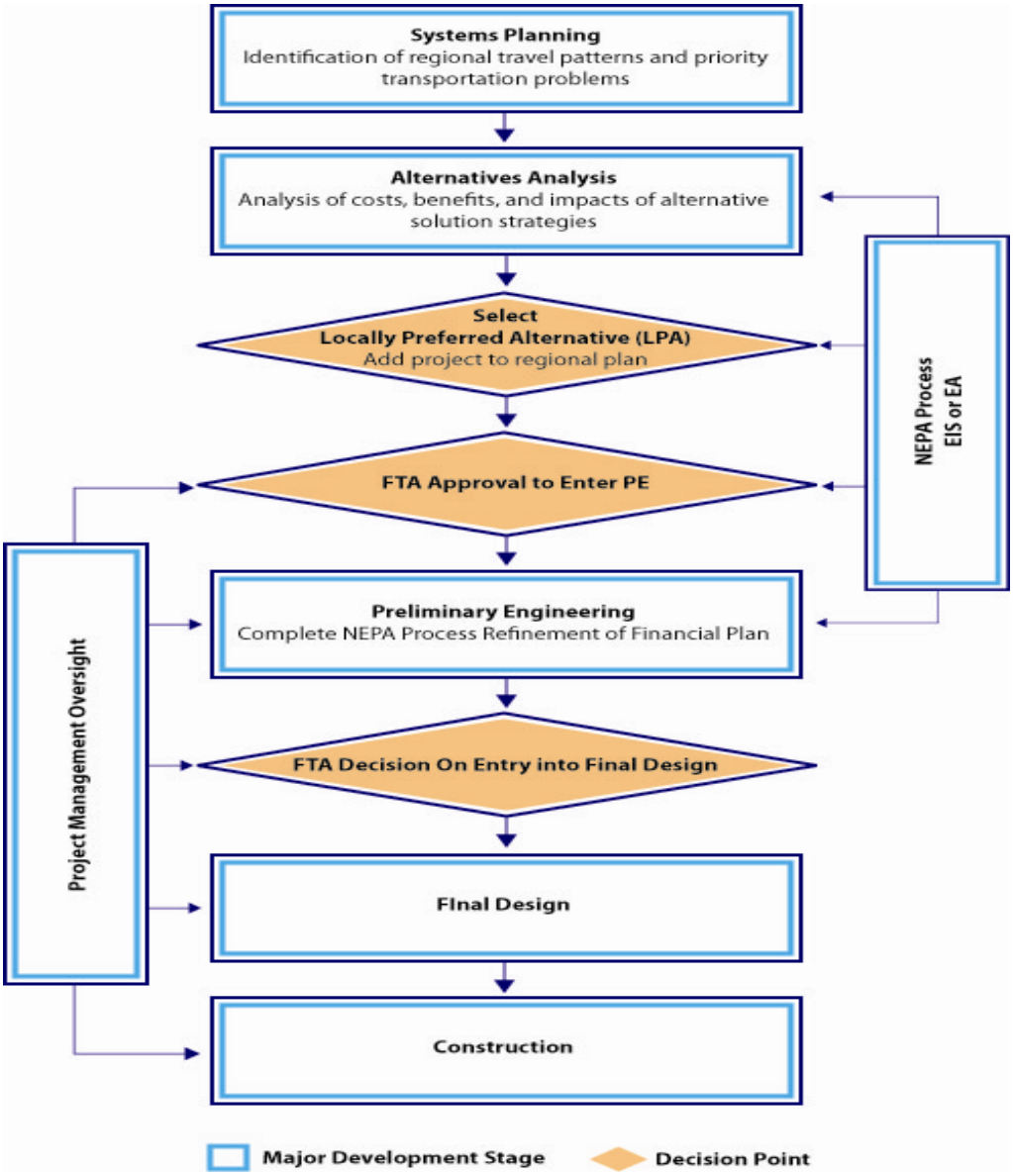
An alternatives analysis that will meet FTA requirements would need a significant investment by the region. Most notably, FTA requires that high-capacity transit alternatives be analyzed using a state-of-the-art regional mode choice model. COMPASS currently uses a mode choice model that has borrowed significant elements from the Salt Lake City regional model. While the Salt Lake City region has many similarities to the Boise region, FTA is not likely to approve an alternatives analysis until a Boise area-specific mode choice model is developed and implemented.

In addition to model improvements, a full AA typically includes preparing detailed design concepts for a series of transit mode and alignment alternatives. These design concepts provide the basis for comparing the cost, impacts and performance of the transit alternatives. The effort involved in preparing and analyzing design concepts is beyond the scope of this current phase.

This report summarizes the results of the first phase of the alternatives analysis and it will provide the region with an initial screening of potentially promising high-capacity transit modes and alignments to serve the corridor.

This phase of the AA relied on existing data sources including the U.S. Census, COMPASS regional growth projections, COMPASS travel demand model, COMPASS Geographic Information Systems (GIS) database and traffic counts (ITD, ACHD and other sources).

Figure 1-1: FTA Project Development Process



1.3 Purpose and Need

The study Purpose and Need statement outlines the problem that is intended to be solved by the project. It serves as the basis for developing evaluation criteria upon which to evaluate each mode and alignment alternative. The Purpose and Need statement was developed by the study team and the Regional Technical Advisory Committee (RTAC) subgroup that directed the study.

Project Purpose

The purpose of the Treasure Valley High Capacity Transit Study is to develop the most appropriate high capacity transit strategy to improve mobility and accessibility between Caldwell, Nampa, Meridian, west Boise, and central Boise. The preferred strategy should help to manage the forecast increase in travel demand in the I-84 travel shed, support local and regional transportation plans, expand mobility choices, support local comprehensive plans, and support the *Communities in Motion* vision for accommodating growth in the corridor.

Need for the Treasure Valley HCT Project

The need for the Treasure Valley HCT Project is grounded in the significant population and employment growth in the valley and the impact that growth has had and is forecast to have on the performance of the transportation system.

Population Growth in the Corridor

- Canyon County doubled in population from 1990 to 2007.
- The City of Meridian population grew from less than 10,000 in 1990 to nearly 60,000 in 2007.
- Over two-thirds of the Boise region's current population and forecast growth is concentrated in this corridor.
- Corridor population is forecast to grow by 39% between 2008 and 2030. (*Communities in Motion,* 2006. All population and employment forecast data presented here is based on this dataset).

Employment Growth in the Corridor

- Corridor employment is forecast to grow to over 350,000 by 2030, accounting for over 83% of the region's jobs.

- Nearly 60,000 new jobs are forecast in the western parts of the corridor (Caldwell and Nampa) by 2030, a growth of more than 139%.
- Job growth in the western parts of the corridor will lead to more balanced directional flow for commute trips.

Deteriorating Transportation Performance in the Corridor

- The proportion of Caldwell workers who have a commute greater than 30 minutes increased from 18% in 1990 to 30% in 2000.
- Daily traffic volumes on I-84 are forecast to increase by 30% to 50% by 2030.
- The reliability and overall travel times for commuter bus services in the corridor have degraded and are forecast to continue to degrade with the forecast growth in traffic and congestion in the corridor.

Change in Work Trip Patterns

- Both Nampa and Caldwell have seen a significant increase in commuters traveling to Ada county jobs.
- Work trips traveling between the Nampa/Caldwell area to downtown Boise are forecast to increase significantly by 2030.

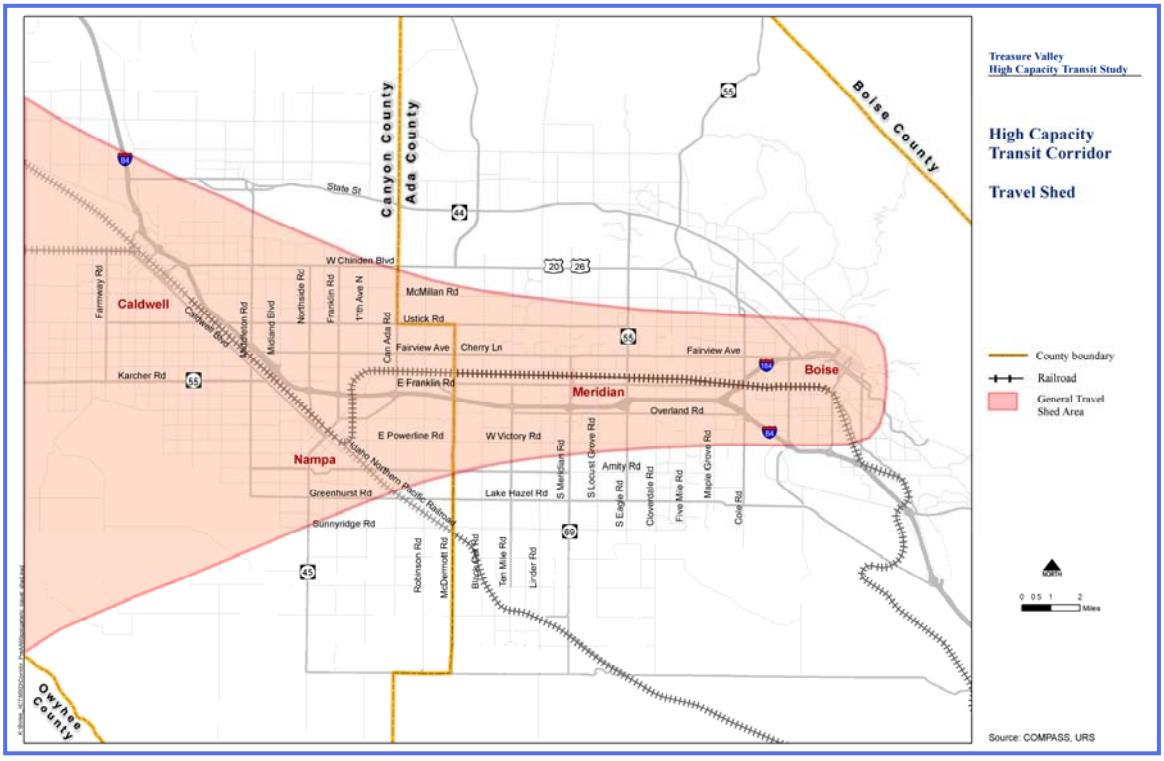
Growth in Downtown Boise

- Downtown Boise employment is forecast to double by 2030 and downtown population is forecast to more than triple.
- Even with the significant employment growth in Caldwell, Nampa, and other areas downtown Boise employment is forecast to grow by 34,000 and increase its share of regional employment from 12% to 14%.
- Downtown Boise will continue to be the major business, governmental, cultural, and educational center for southwest Idaho.

2.0 Study Corridor

The term "corridor" typically refers to a wide swath through which one or more transportation facilities travel in the same general direction. For FTA studies, the definition is a bit broader and typically includes the geographic area that would be served by bus routes that would function as feeder routes to an HCT station. In this case, a typical radial HCT corridor will result in a fan-shaped corridor which is wider further out and narrowing as it approaches the downtown or central city (see Figure 2-1).

Figure 2-1: Representative Corridor

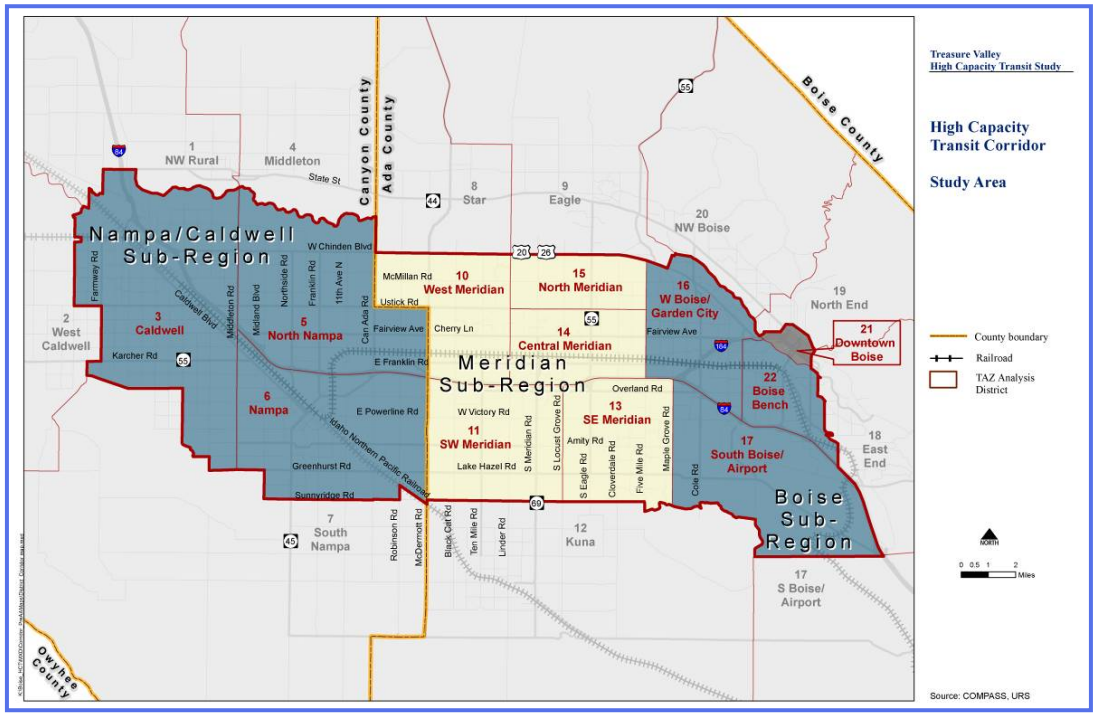


While *Communities in Motion* recommended conducting an alternatives analysis focused on the Boise Cutoff rail alignment, other potential HCT routes that could serve the same general travel shed need to be considered in an FTA compliant alternatives analysis. To fully capture the travel corridor between Caldwell, Nampa, Meridian and Boise, a range of possible HCT alignments were considered for this study.

The study corridor has been defined using the transportation analysis zones (TAZ's) from the COMPASS regional travel demand model. The TAZ's have been aggregated into 22 districts covering the entire region, with 12 of those

comprising the Treasure Valley Corridor. The corridor districts are displayed in Figure 2-2.

Figure 2-2: District/Corridor Map



The initial narrowing of alignments was based on this corridor definition and TAZ districts. It should be noted that the districts are assigned geographic names that in some cases are the names of cities (e.g. Nampa). The use of city names is intended to provide a general sense of the geographic area being referenced; however, the districts do not match city boundaries.

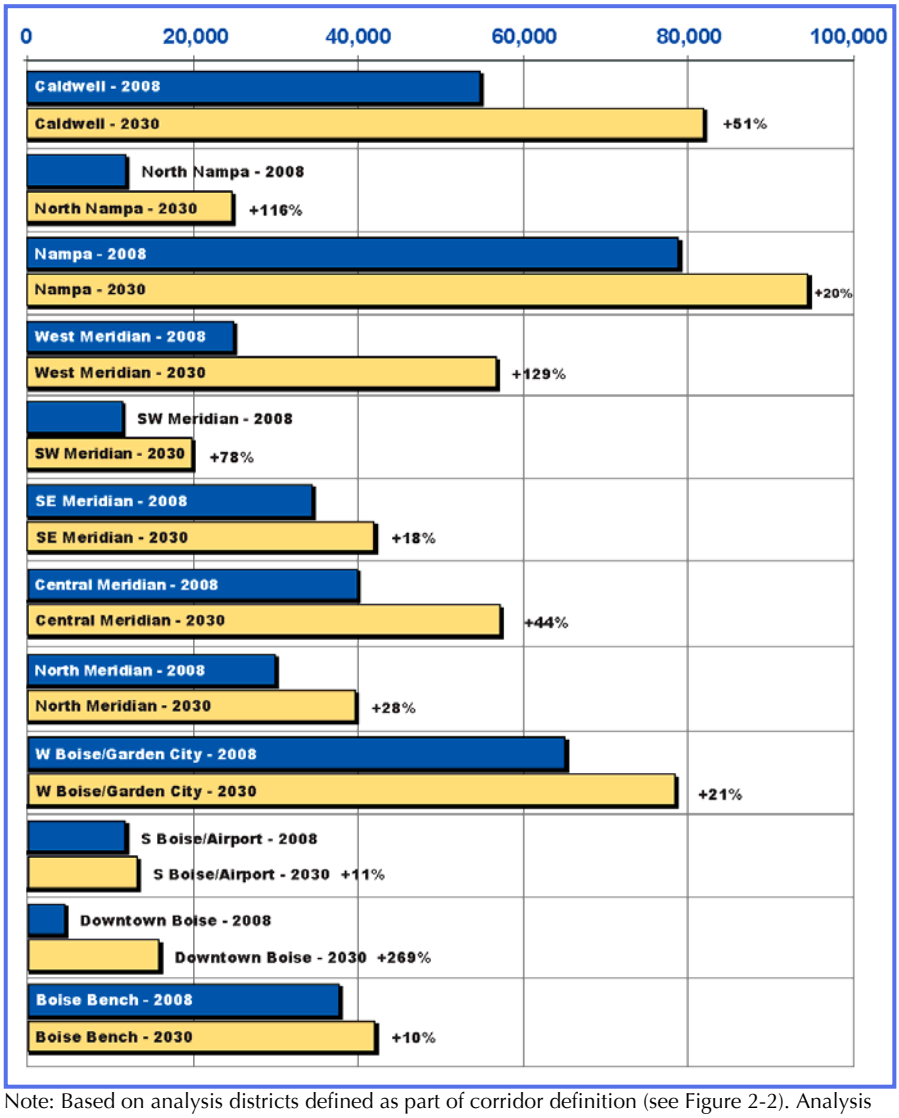
Initial travel market evaluation and population and employment data are based on the districts defined by this corridor definition.

2.1 Population and Employment

Census data shows that the region grew very rapidly between 1990 and 2000 and between 2000 and 2007. High growth in population and jobs are projected to continue. Figure 2-3 provides 2008 and 2030 population data using the HCT Corridor analysis districts described above. This data is used in the COMPASS regional travel demand model and reflects the most up-to-date information on population and employment growth within the corridor. The source of these data is the *Community Choices Forecast* data set, published

by COMPASS as part of the *Communities in Motion* planning process.[1]

Figure 2-3: Treasure Valley Corridor
Total Population and Population Growth by Analysis District (2008 and 2030)



Note: Based on analysis districts defined as part of corridor definition (see Figure 2-2). Analysis district boundaries do not match city boundaries.

Source: Communities Choices Forecast data set, COMPASS, 2009

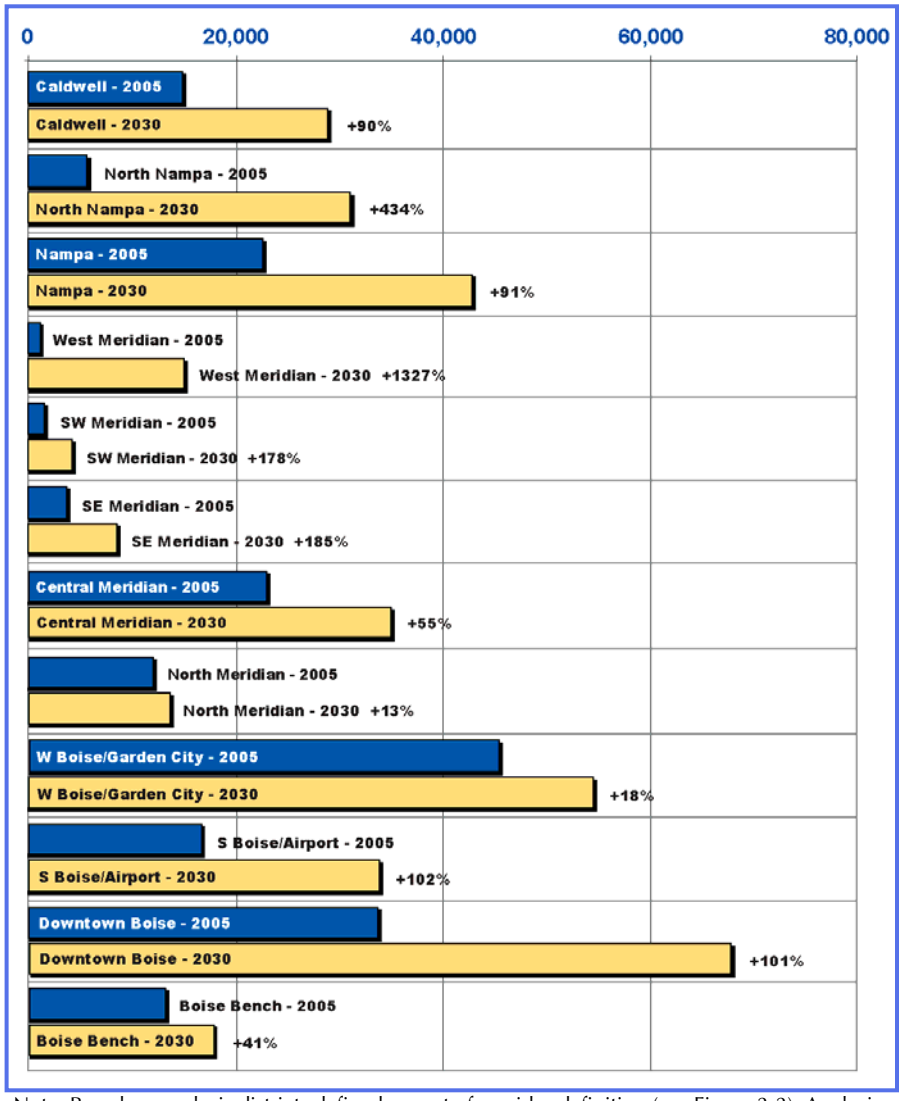
As shown in Figure 2-3, the analysis districts with the largest projected increases in population are West Meridian and Caldwell, with over 27,000 additional persons each by 2030. The highest percentage increases in population are projected to occur in North Nampa, West Meridian, and downtown Boise. While downtown Boise has a high percentage growth rate, the current population is relatively low. By 2030, even with a high percentage growth rate, downtown Boise is

1 http://www.compassidaho.org/prodserv/demo-forecasts.htm

projected to remain among the lower population districts. The largest concentrations of population growth are projected to occur in Meridian, Nampa, and Caldwell.

Figure 2-4 provides 2005 and 2030 employment data using the HCT Corridor analysis districts and the *Community Choices Forecast* data set.

Figure 2-4: Treasure Valley Corridor
Total Jobs and Job Growth by Analysis District (2005 and 2030)



Note: Based on analysis districts defined as part of corridor definition (see Figure 2-2). Analysis district boundaries do not match city boundaries.

Source: Communities Choices Forecast data set, COMPASS

As shown in Figure 2-4, the highest growth in number of jobs is projected to occur in downtown Boise, with significant increases in jobs also occurring in Nampa, North Nampa, and

South Boise. High percentage increases are projected to occur in Meridian, North Nampa, downtown Boise, and South Boise.

While household and employment are projected to increase in every district between today and 2030, population growth is pronounced in the western portions of the corridor, while employment growth is most pronounced in both the western and eastern portions of the corridor. The net result of this pattern would be an overall increase in demand for east-west travel within the corridor in 2030.

2.2 Transportation Context

Travel Markets

The districts that include central business districts are the largest work trip destinations in 2008 and in 2030. The largest work trip destinations are downtown Boise and West Boise/Garden City. The districts that include downtown Meridian, Nampa, and Caldwell are also significant work trip destinations.

There is growth in the distance of work trips from 2008 to 2030. Travel for work from the Nampa/Caldwell sub-region to the Boise sub-region increases from 12% in 2008 to 25% in 2030, an increase from 9,300 to 28,000. Of particular note is the increase between 2008 and 2030 in the proportion of work trips destined for the Nampa/Caldwell sub-region from both the Meridian sub-region (increased from 1% to 24%) and the Boise sub-region (increased from 1% to 16%). In raw numbers these are increases from 1,300 to 33,000 from the Meridian sub-region and 700 to 14,000 from the Boise sub-region. This is due to significant employment growth planned for the Nampa/Caldwell sub-region, particularly in the Nampa and North Nampa districts.

Overall, the model indicates a growth in trips between the Nampa/Caldwell area and Boise in 2030, particularly in work trips. In particular, the major work trip destinations tend to be the central business districts of Nampa, Caldwell, Meridian, and Boise. This travel market has the potential to be well served by a high-capacity transit line in this corridor.

Existing Transit Service

Valley Regional Transit, the transit provider for the Boise metropolitan area, including Ada and Canyon Counties, operates bus routes in the Treasure Valley study area. Routes in the study area provide service on or parallel to potential HCT alignments within the corridor, including six local Boise

routes, five inter-county express routes, and four routes providing service between Nampa and Caldwell.

Congestion

Several sources were evaluated for information on congestion. COMPASS tracks peak hour congestion on certain routes through the *Congestion Management System Plan*, which is updated annually.[2] Several segments of roadways within the study corridor had congestion ratings of "high" for 2007, the most recent data available at the time of this study. Areas of congestion existed on Chinden Boulevard, Ustick Road, Fairview Avenue/Cherry Lane, Franklin Road, I-84, and Overland Road.

Congestion on I-84 was assessed by the Idaho Transportation Department in 2008.[3] This study found 30 to 50 percent increases in average daily traffic volumes projected between 2008 and 2030. Several interchanges along the corridor were found to have congestion at the ramp terminals today.

2 COMPASS, Treasure Valley Annual Congestion Management System Report, 2007. http://www.compassidaho.org/documents/prodserv/reports/CMSAnnual2007.pdf.
3 Idaho Transportation Department, I-84 Karcher Interchange to Five Mile Road Environmental Study, Traffic Analysis Report, April 2008.

3.0 High Capacity Transit Modes

This section describes the range of HCT modes that are available and how they are typically used. Certain high capacity transit modes such as monorail, personal rapid transit and maglev are not considered applicable in the Treasure Valley due to high cost and service characteristics that are not consistent with anticipated future land uses in the valley.

The HCT modes described here could be considered in an alternatives analysis for the Treasure Valley corridor west from Boise connecting downtown Boise with Meridian, Nampa and Caldwell. The modes described here include:

- Express Bus
- Bus Rapid Transit (BRT)
- Commuter Rail
- Light Rail

3.1 Express Bus

Sound Transit Express Coach

Express bus operations are non-stop or limited-stop services typically connecting suburban park-and-rides with a major downtown or employment center. They are most commonly used to serve the peak hour commuter market. Express buses run in mixed traffic and make use of HOV lanes where available. Typical vehicles include conventional buses as well as coaches designed for greater passenger comfort over a longer distance.

3.2 Bus Rapid Transit

TransMilenio BRT System – Bogota, Columbia

Bus Rapid Transit (BRT) is an evolution of conventional bus transit that utilizes a wide range of features designed to increase the speed, capacity, and attractiveness of the mode. Originally designed as a low-cost alternative to light rail, BRT generally includes higher-capacity vehicles, station stops spaced further apart than conventional bus stops, increased passenger amenities like off-board fare collection and real-time bus arrival information, and some form of signal priority treatment to reduce transit travel time and help buses stay on schedule.

BRT can be considered as a wide spectrum of transit enhancements ranging from a bus operating in a fully exclusive guideway (or busway) to a bus operating in mixed traffic with improved stations, queue-bypass lanes and signal priority. Many BRT systems have evolved with a mix of exclusive guideway and mixed traffic elements depending on

the width of the available right-of-way and the level of congestion on the adjacent roadway. Some BRT systems use buses with doors on both sides to allow service to stations on either side of the roadway.

3.3 Commuter Rail

Commuter Rail is a rail technology that can offer very high passenger capacity and high speed. It typically operates during peak hours on existing freight railroads, however some operations have publicly-owned trackage. Commuter rail operations sharing track owned by freight rail operators must reach an operating agreement with the owner which typically defines a limited operating window available for commuter rail operations.

Sounder Commuter Rail, Seattle, WA

The most common commuter rail operations use a locomotive-hauled passenger rail train with a locomotive pulling passenger railcars. Additional cars can be added to a train set as demand requires. An emerging vehicle type being used for commuter rail operations is the Diesel Multiple Unit (DMU).

3.4 Light Rail

Light rail is an electric railway powered by an overhead wire that provides intra-city transit service with stations spaced approximately ½ to 2 miles apart. It typically uses an exclusive right-of-way but often has at-grade crossings and it can have limited portions of shared traffic operation. Light rail is in common use today, with many North American cities operating, planning or constructing light rail lines.

MetroRail Light Rail – Houston, TX

There are limited examples of diesel powered light rail operations in North America. Diesel light rail can be used to avoid using overhead wires or when using an existing freight rail corridor.

4.0 Initial Alignment Narrowing

The study team prepared an initial evaluation of a range of potential alignments that could connect Boise, Meridian, Nampa, and Caldwell. As an initial evaluation, this assessment looked at the full range of potential HCT alternatives to determine the most promising to be evaluated in more detail. Several potential HCT alignments that could serve the Treasure Valley were examined.

The following alignments were evaluated:

- Chinden Boulevard (US 20/26)
- Ustick Road
- Fairview Avenue/Cherry Lane
- Boise Cutoff Railroad
- Franklin Road
- I-84/I-184
- Overland Road
- Victory Road/Powerline Road

Figure 4-1 shows these potential alignments and potential connections at the east and west ends.

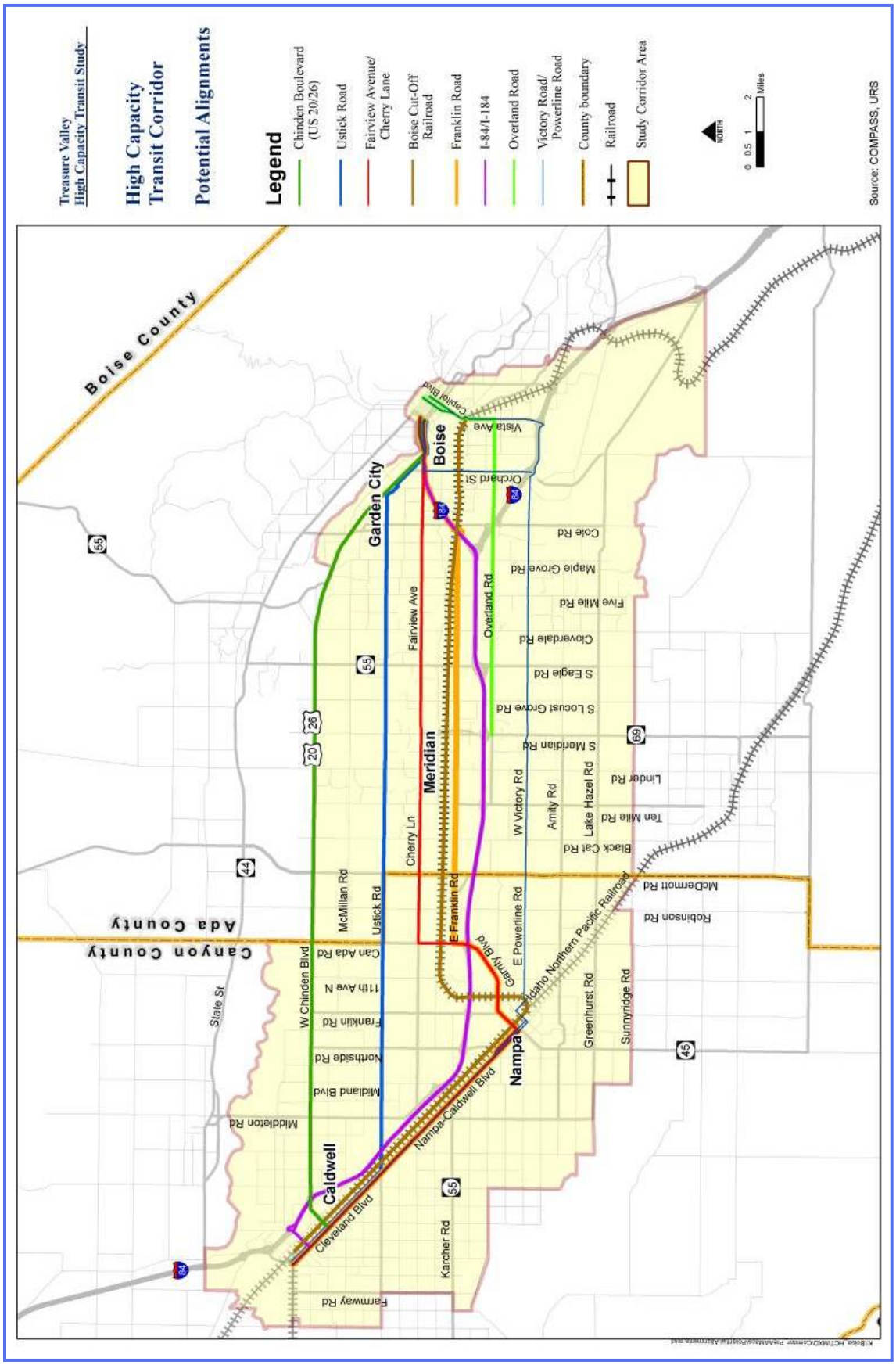


Figure 4-1:
Potential Alignments

In this initial evaluation, each alignment was evaluated for how well it met the project's Purpose and Need including connectivity to major central business districts and major activity centers, the general type of areas it would serve (residential, commercial, etc.) and its general right-of-way width.

Chinden Boulevard and Ustick Road were determined to be too far north to adequately serve downtown Nampa and downtown Meridian. Since the Purpose and Need for the project includes serving these CBDs, these two alignments were removed from further consideration.

Victory Road/Powerline Road was dismissed from further consideration because it does not connect to downtown Meridian and would require out-of-direction travel to reach downtown Boise. This roadway also has a relatively narrow right-of-way.

Further detail on background, planning and demographic context, transportation context, and initial mode and alignment narrowing can be found in *Priority Corridor Phase 1 Alternatives Analysis Technical Memorandum*.

5.0 Definition of Alternatives

Following the initial narrowing of alternatives, five alignments with various mode options were advanced for further study. The mode and alignment options were refined into HCT concepts for modeling and ridership analysis. The purpose of this initial modeling was to learn how each of the concepts would perform as an HCT line. In order to model the alternatives, the concepts were described to a moderate level of detail, however, ***it should be understood that much more detailed design and analysis would be needed to determine the feasibility of each of the concepts in terms of routing, traffic impacts, and right-of-way requirements.***

The following mode and alignment concepts were defined and modeled:

- Fairview Avenue/Cherry Lane:
    - Light Rail
    - BRT - Exclusive
    - BRT - Mixed Traffic
- Franklin Road
    - Light Rail
    - BRT - Exclusive
    - BRT - Mixed Traffic
- Overland Road
    - Light Rail
    - BRT - Exclusive
    - BRT - Mixed Traffic
- Boise Cutoff
    - Commuter Rail
    - Light Rail
    - BRT - Exclusive
- I-84/I-184
    - BRT - Exclusive
    - BRT - Mixed Traffic

Light Rail on the arterial alignments (Fairview/Cherry, Franklin, and Overland) was assumed to operate in an exclusive running way in the roadway median. At this early planning stage, it was assumed that exclusive guideway modes would not take away an existing traffic lane, but would be added to the existing or planned roadway cross-section. Light Rail stations would be located approximately every 2 miles, except in the downtown areas where they would be spaced more closely.

BRT - Exclusive would operate similarly to Light Rail. It was assumed to be located in an exclusive running way in the

median on the arterial alignments. Signal priority would enable both Light Rail and BRT - Exclusive to stay on schedule and maintain reliable service.

BRT - Mixed Traffic was assumed to operate in existing traffic lanes with general purpose traffic on the arterial alignments. Stations would be located on the curbside lane. Some signal priority and queue bypass lanes would be added where appropriate to facilitate transit movement through the most congested intersections. Station spacing for BRT - Mixed Traffic was assumed to be similar to BRT - Exclusive, and Light Rail.

Commuter Rail on the Boise Cutoff, was assumed to operate on existing tracks with an eastern terminus at the Boise Depot. Since the Boise Depot is located approximately one mile from downtown Boise, a bus was assumed to connect with the Commuter Rail line at the Depot to connect passengers to downtown Boise and the multimodal center. At the western end of the Boise Cutoff, this study assumed that Commuter Rail could be added along side the Union Pacific Railroad (UPRR) main line between Nampa and Caldwell. This concept was not studied in detail, and would require a much more detailed study to determine its feasibility.

Light Rail or BRT - Exclusive on the Boise Cutoff would operate on a new exclusive guideway adjacent to the existing railroad tracks. UPRR policy requires any transit alignment adjacent to its tracks to be separated from the tracks by at least 50 feet (or use a crash-resistant wall). In Nampa, at the western end of the Boise Cutoff, Light Rail or BRT - Exclusive would need to cross over the Union Pacific main line tracks, most likely on a grade-separated structure, and operate on local streets in downtown Nampa. Details of this crossing and the alignment connecting Nampa and Caldwell via Nampa-Caldwell Boulevard have not been developed. Further discussion on routing for each alignment concept is provided below.

Two HCT concepts were developed for I-84 that are different from the concepts on the other alignments. One freeway HCT concept was BRT - Mixed Traffic, which would be an express-style bus route with a limited number of stops located either on interchange ramps or along the freeway shoulder. Referred to as flyer stops, these would enable a bus to save time by not having to leave the freeway and get tied up in traffic on ramps or local streets. Park-and-rides would be designed to have a direct pedestrian connection to the flyer stops.

The other freeway HCT concept was BRT - Exclusive, which was assumed to operate in an exclusive guideway within the freeway right-of-way. This was analyzed as a new facility that would be added to the existing or planned general purpose lanes. This could take several forms, including an exclusive bus-only lane added to either the left or the right side of general purpose lanes or an exclusive guideway entirely separate from the freeway lanes.

Figures 5-1 through 5-6 show the refined alignment concepts. These concepts were used for the analysis using COMPASS' regional travel demand model. These HCT concepts were developed only for analysis purposes and have not been fully designed. These concepts allow for comparisons among the various potential modes and alignments.

5.1 Fairview Avenue/Cherry Lane Alignment

Figure 5-1 shows the Fairview Avenue/Cherry Lane alignment concept that was analyzed for Light Rail, BRT - Exclusive and BRT - Mixed Traffic. The Fairview Avenue/Cherry Lane alignment would originate at the multimodal center in downtown Boise. It would utilize the Fairview and Main one-way couplet between downtown and Orchard Street. From there it would utilize Fairview Avenue/Cherry Lane as far west as Idaho Center Road, then south on Idaho Center Road, Garrity Boulevard, and 11th Avenue into downtown Nampa. From Nampa it would run northwest on Nampa-Caldwell Boulevard into downtown Caldwell. This routing is only an initial concept for analysis purposes. Further study may find that this routing concept is not feasible due to right-of-way constraints or traffic impacts. As with any of these alignments, further study would be conducted in later phases of this AA to determine the feasibility and the routing details.

Possible station locations were identified based on local agency plans and bus transfer opportunities, however they do not necessarily represent the final station locations if an alignment were to move forward into project development. Further study that incorporates planned land uses and transit oriented development opportunities would result in more refined station locations. West of Cole Road stations were located approximately two miles apart. East of Cole, in the more urban sections of the corridor, stations were spaced closer together.

Fairview/Cherry near Linder

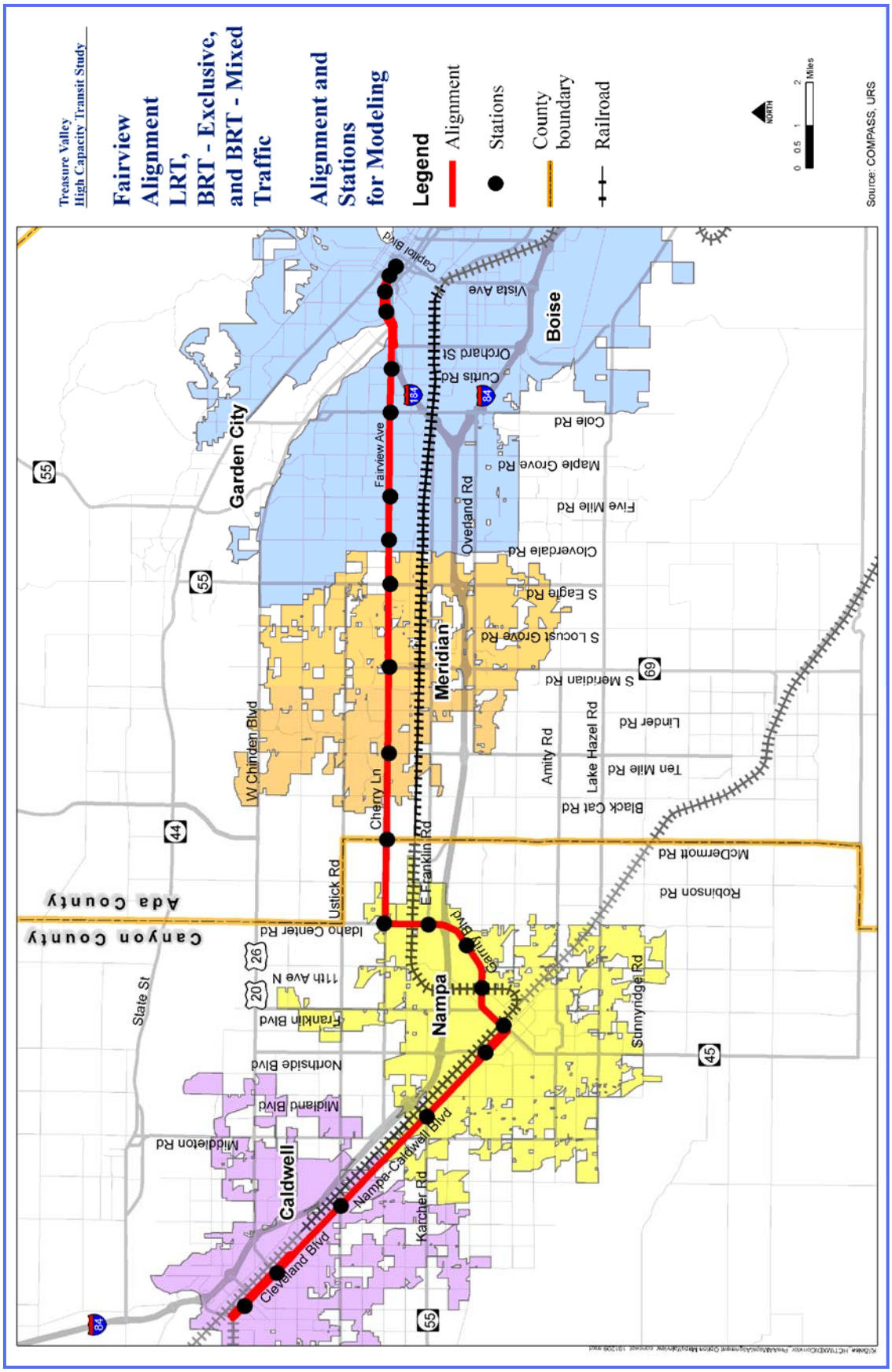


Figure 5-1: Fairview Alignment Concepts:
Light Rail, BRT - Exclusive, and BRT - Mixed Traffic

5.2 Franklin Road Alignment

Figure 5-2 shows the Franklin Road alignment concept that was analyzed for Light Rail, BRT - Exclusive and BRT - Mixed Traffic. The Franklin Road alignment would originate at the multimodal center in downtown Boise and utilize the Fairview and Main couplet as far west as Orchard Street. From here, Light Rail and BRT - Exclusive would run south on Orchard Street as far as Irving Street and then utilize the Boise Branch railroad line, a short line that branches off the Boise Cutoff line and once ran directly into downtown Boise, to the southwest and connect with Franklin Road near Curtis Road. BRT - Mixed Traffic would continue south on Orchard Street to Franklin Road and turn west. All modes would follow Franklin Road to Idaho Center Road and then turn south. From here, the Franklin Road alignment would be identical to the Fairview Avenue/Cherry Lane alignment, utilizing Garrity Boulevard, 11th Avenue and Nampa-Caldwell Boulevard. As with the Fairview Avenue/Cherry Lane alignment, this routing is only an initial concept for analysis purposes. Further study may find that this routing concept is not feasible due to right-of-way constraints or traffic impacts. As with any of these alignments, further study would be conducted in later phases of this AA to determine the feasibility and the routing details.

Possible station locations were identified based on local agency plans and bus transfer opportunities, however they do not necessarily represent the final station locations if an alignment were to move forward into project development. Further study that incorporates planned land uses and transit oriented development opportunities would result in more refined station locations. West of Cole Road stations were located approximately two miles apart. East of Cole, in the more urban sections of the corridor, stations were spaced much closer together.

Franklin near Curtis

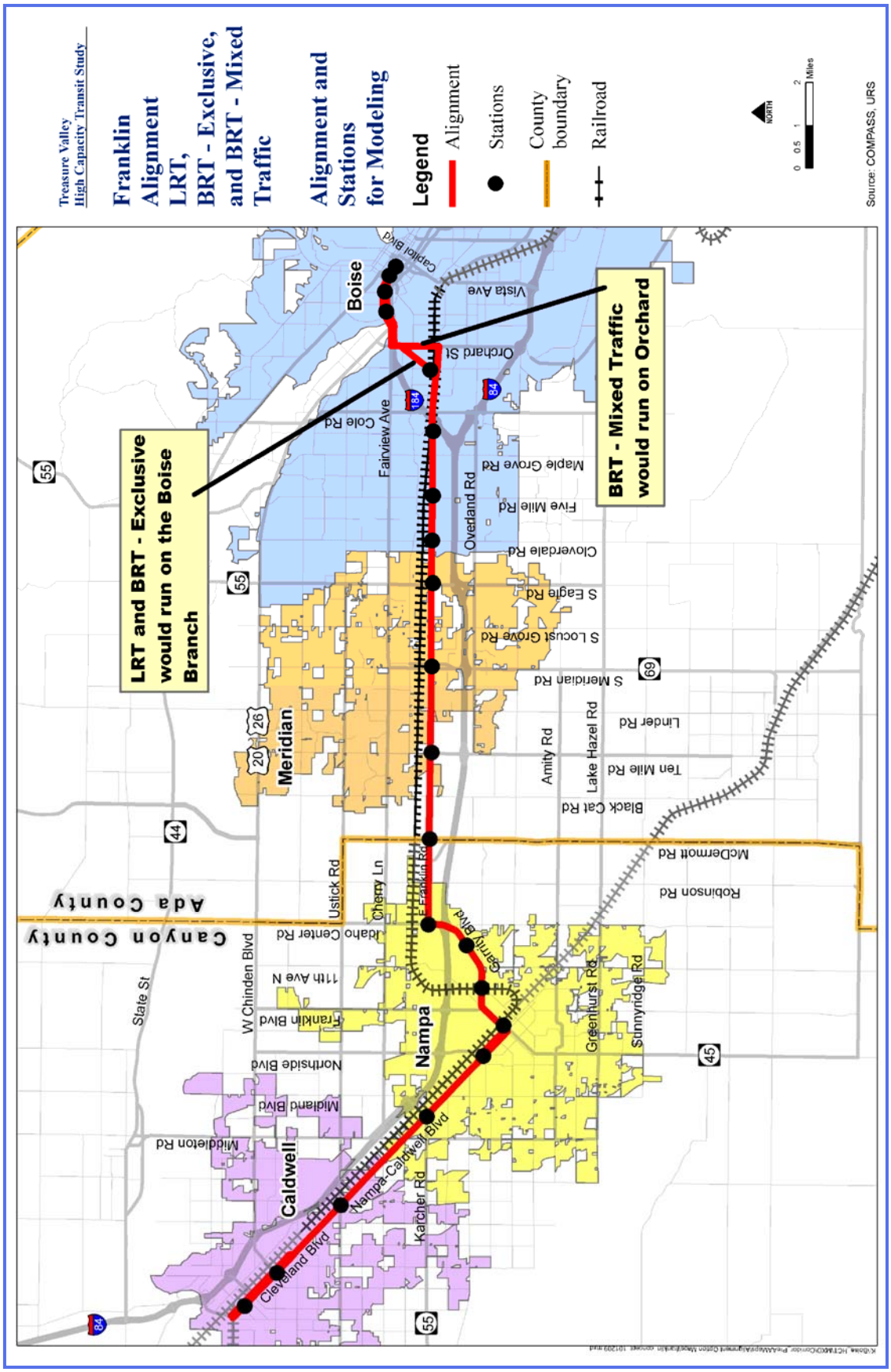


Figure 5-2: Franklin Alignment Concepts:
Light Rail, BRT - Exclusive, and BRT - Mixed Traffic

5.3 Overland Road Alignment

Figure 5-3 shows the Overland Road alignment concept that was analyzed for Light Rail, BRT - Exclusive and BRT - Mixed Traffic. The Overland Road alignment would originate at the multimodal center in downtown Boise and run south along Capitol Boulevard and Vista Avenue to Overland Road. Plans call for extending Overland Road west and connecting it with the existing street grid in Nampa. Study for this is underway, but an exact routing has yet to be determined. The Overland Road alignment would follow this routing to Garrity Boulevard and follow the same alignment as the Fairview Avenue/Cherry Lane and Franklin Road alignments, following Garrity Boulevard, 11th Avenue, and Nampa-Caldwell Boulevard. As with the other alignments, this routing is only an initial concept for analysis purposes. Further study may find that this routing concept is not feasible due to right-of-way constraints or traffic impacts. As with any of these alignments, further study would be conducted in later phases of this AA to determine the feasibility and the routing details.

Possible station locations were identified based on local agency plans and bus transfer opportunities, however they do not necessarily represent the final station locations if an alignment were to move forward into project development. Stations would generally be located at the same cross streets as the other alignments. One key difference with the Overland Road alignment is that it could directly serve Boise State University. Exact station locations would be refined in later phases of the study.

Nampa-Caldwell Blvd.

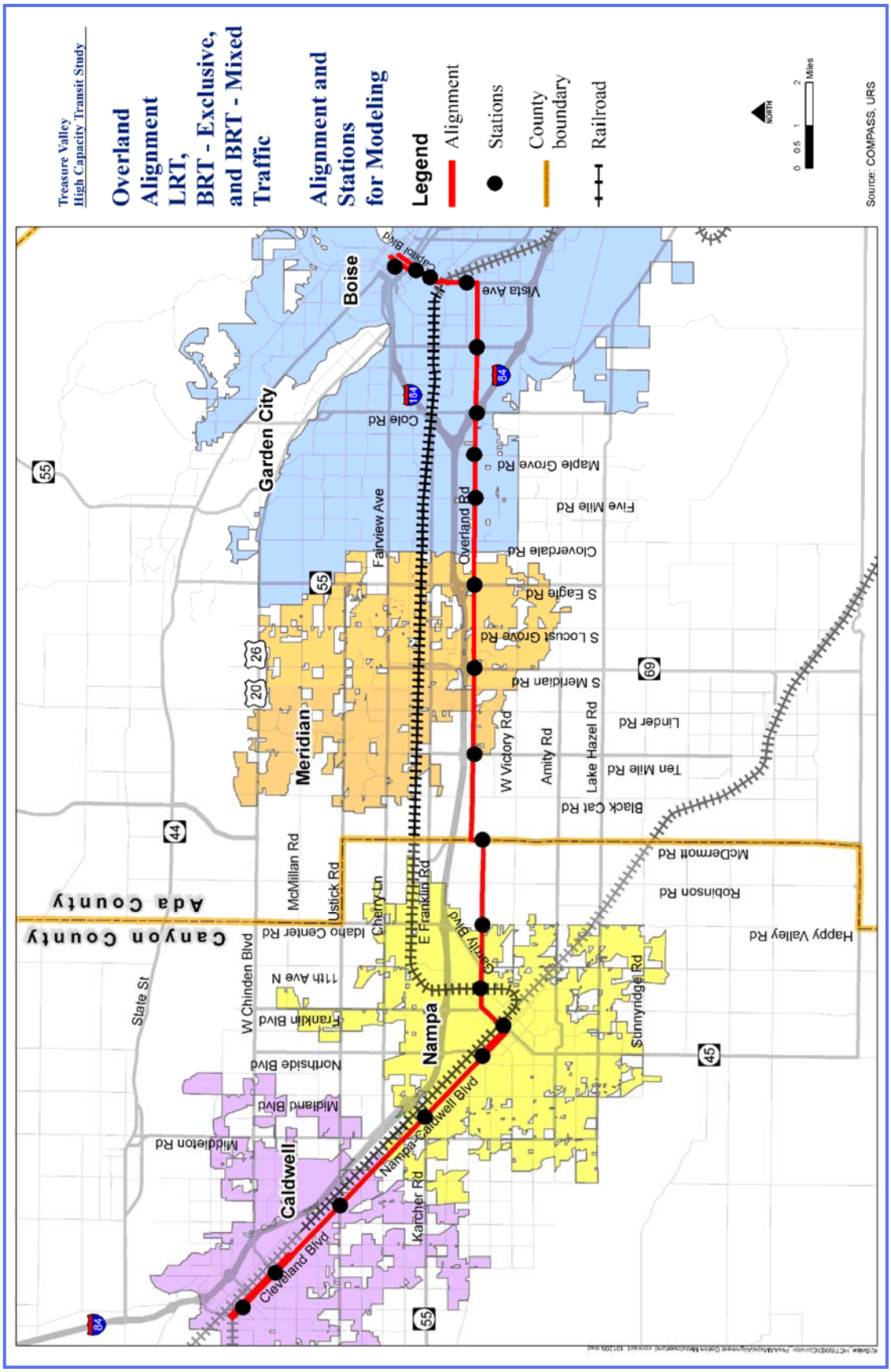


Figure 5-3: Overland Alignment Concepts:
Light Rail, BRT - Exclusive, and BRT - Mixed Traffic

5.4 Boise Cutoff Alignment

Three HCT concepts were analyzed on the Boise Cutoff, Light Rail, BRT - Exclusive and Commuter Rail. The Light Rail and BRT - Exclusive concepts include more frequent station spacing and a direct connection to the downtown Boise multimodal center. The Commuter Rail concept includes fewer stations (more typical of a commuter rail operation) and would require a bus connection between the eastern terminus at the Boise Depot and the multimodal center.

Figure 5-4 shows the concept that was analyzed for Commuter Rail on the Boise Cutoff. The Commuter Rail would operate from the Boise Depot, with a bus carrying passengers between downtown Boise and the Boise Depot. The Commuter Rail concept includes passenger rail utilizing the existing Boise Cutoff railroad tracks to Nampa. From the western end of the Boise Cutoff in Nampa, the Commuter Rail concept would utilize new right-of-way adjacent to the UPRR main line right-of-way between downtown Nampa and downtown Caldwell. This segment would require further study to determine the feasibility of adding new right-of-way adjacent to the UPRR right-of-way. Additional study would also be needed to determine how the downtown Boise bus would operate and connect with the Commuter Rail line at the Boise Depot. It may be feasible, for example, to create a new transfer point slightly east of the Boise Depot, where more space could be available for bus staging. At this early phase in the study, the Boise Depot was assumed as the transfer point for analysis.

Station spacing for the Commuter Rail line was assumed to be much wider than for the arterial alignments. Stations for the Commuter Rail line were assumed to be 2 to 6 miles apart, enabling a relatively high speed service.

Boise Cutoff Railroad at Idaho Center

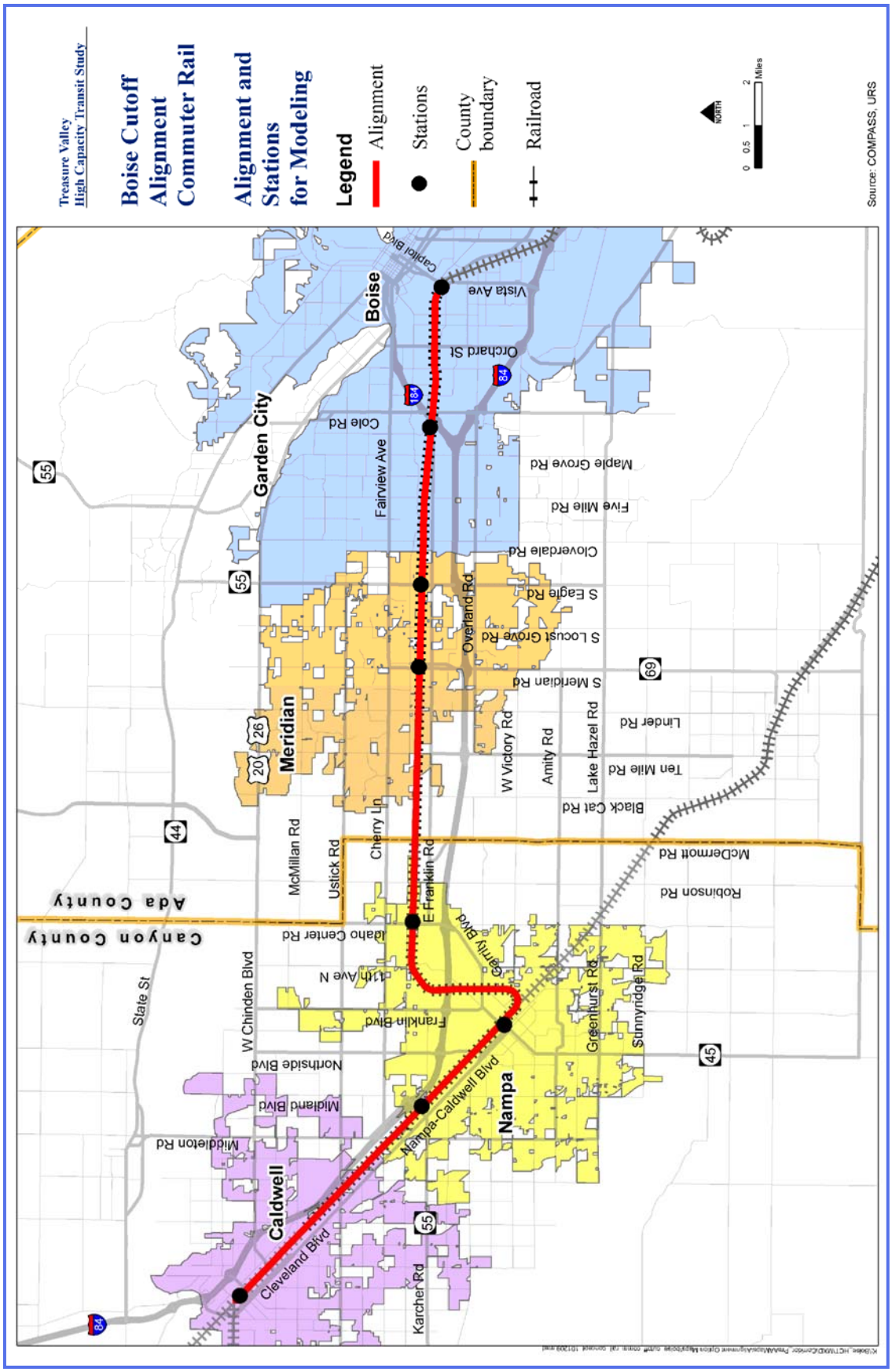


Figure 5-4: Boise Cutoff Commuter Rail Concept

Figure 5-5 shows the concepts that were analyzed for Light Rail and BRT - Exclusive on the Boise Cutoff. These would both run in exclusive running ways adjacent to the existing tracks. Rather than connecting to the Boise Depot, Light Rail and BRT - Exclusive would directly serve the downtown Boise multimodal center. These two concepts would originate at the multimodal center and run west along the Fairview and Main couplet as far as Orchard Street. They would turn south on Orchard Street to Irving Street, where they would enter the railroad right-of-way of the Boise Branch and run adjacent to the existing tracks. The Boise Branch meets the Boise Cutoff near Curtis Road, where the alignment would then follow the Boise Cutoff, running adjacent to the existing tracks to the western end of the Boise Cutoff in Nampa.

From the western end of the Boise Cutoff, Light Rail or BRT - Exclusive would cross the tracks and enter street operation in downtown Nampa. Further study would be needed to determine the feasibility of crossing the UPRR main line tracks with an exclusive guideway. Light Rail or BRT - Exclusive would then travel northwest on Nampa-Caldwell Boulevard to downtown Caldwell. As with the other alignments, further study would be needed to determine how this alignment would be routed through downtown Nampa, and whether Nampa-Caldwell Boulevard would be a feasible alignment.

There would be more stations on this alignment than with the Boise Cutoff Commuter Rail alignment. However, there would be slightly fewer stations than with the arterial alignments. This concept would test whether there is an advantage to running on the Boise Cutoff, which could provide for higher speeds than would be available on an arterial alignment.

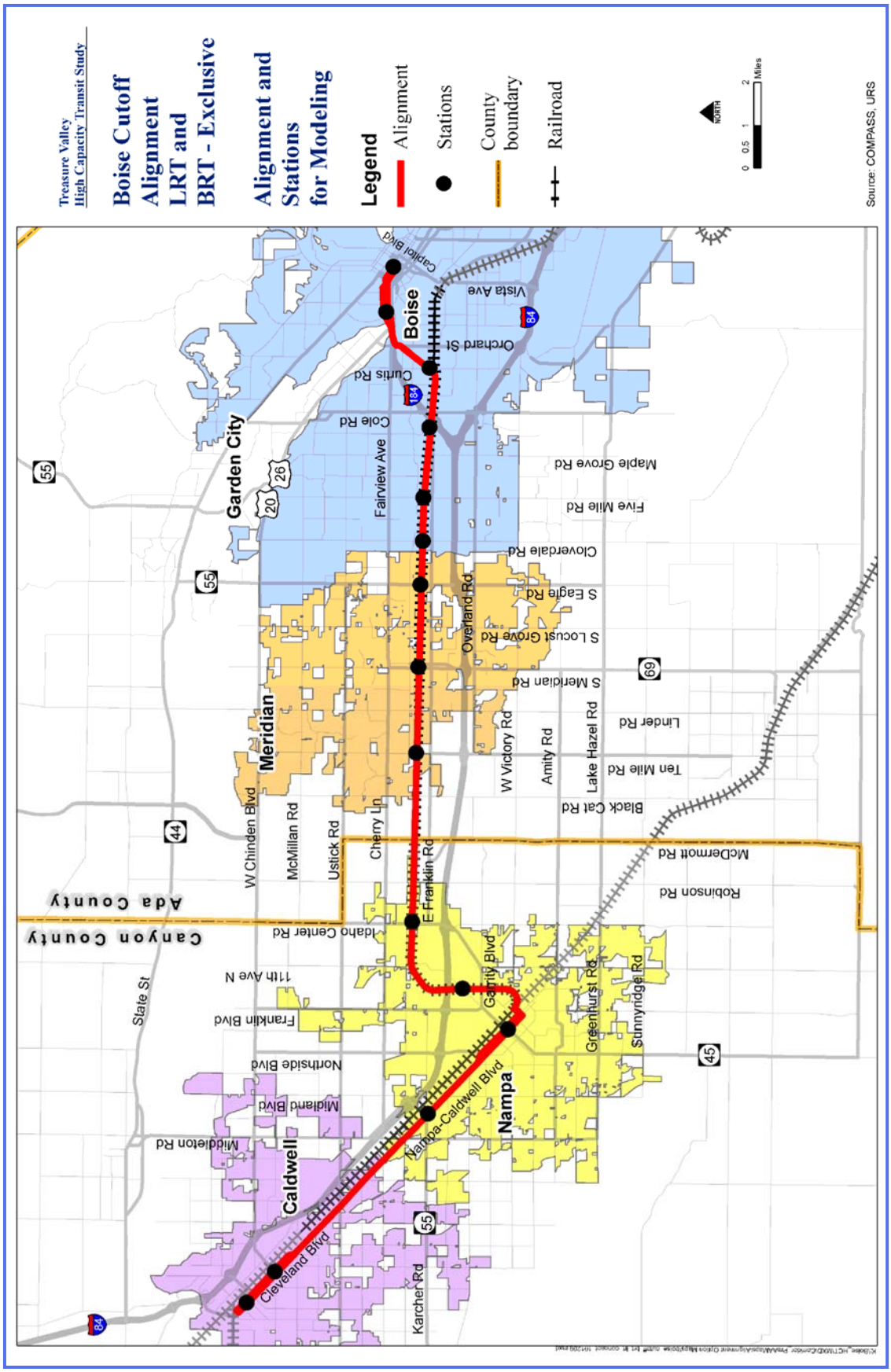


Figure 5-5: Boise Cutoff
Light Rail and BRT - Exclusive Concepts

5.5 I-84/I-184 Alignment

Figure 5-6 shows the I-84/I-184 BRT alignment concept that was analyzed. Both a BRT - Mixed Traffic and a BRT - Exclusive HCT concept were developed along I-84/I-184. This alignment, like the Boise Cutoff Commuter Rail, would have fewer stops than the arterial alignments, which would allow for an express-style service operation. The alignment would begin at the multimodal center in downtown Boise and travel west along the Fairview and Main couplet, accessing I-184 at the Fairview interchange. It would follow I-184 and I-84 as far west as the Highway 20/26 interchange in Caldwell, where it would exit and use 21st Avenue and the Cleveland Boulevard/Blaine Street couplet to travel into downtown Caldwell. Further study would be needed to determine the exact routing details.

Stations would generally be located on interchange ramps in order to limit out-of-direction travel by buses on local streets to access park-and-rides. Park-and-rides would be located within walking distance to ramp stations with direct pedestrian overcrossings where needed to provide convenient access between park-and-ride lots and the stations.

These alignment and mode concepts were evaluated against the project Goals and Objectives. The following sections discuss the evaluation criteria and the results.

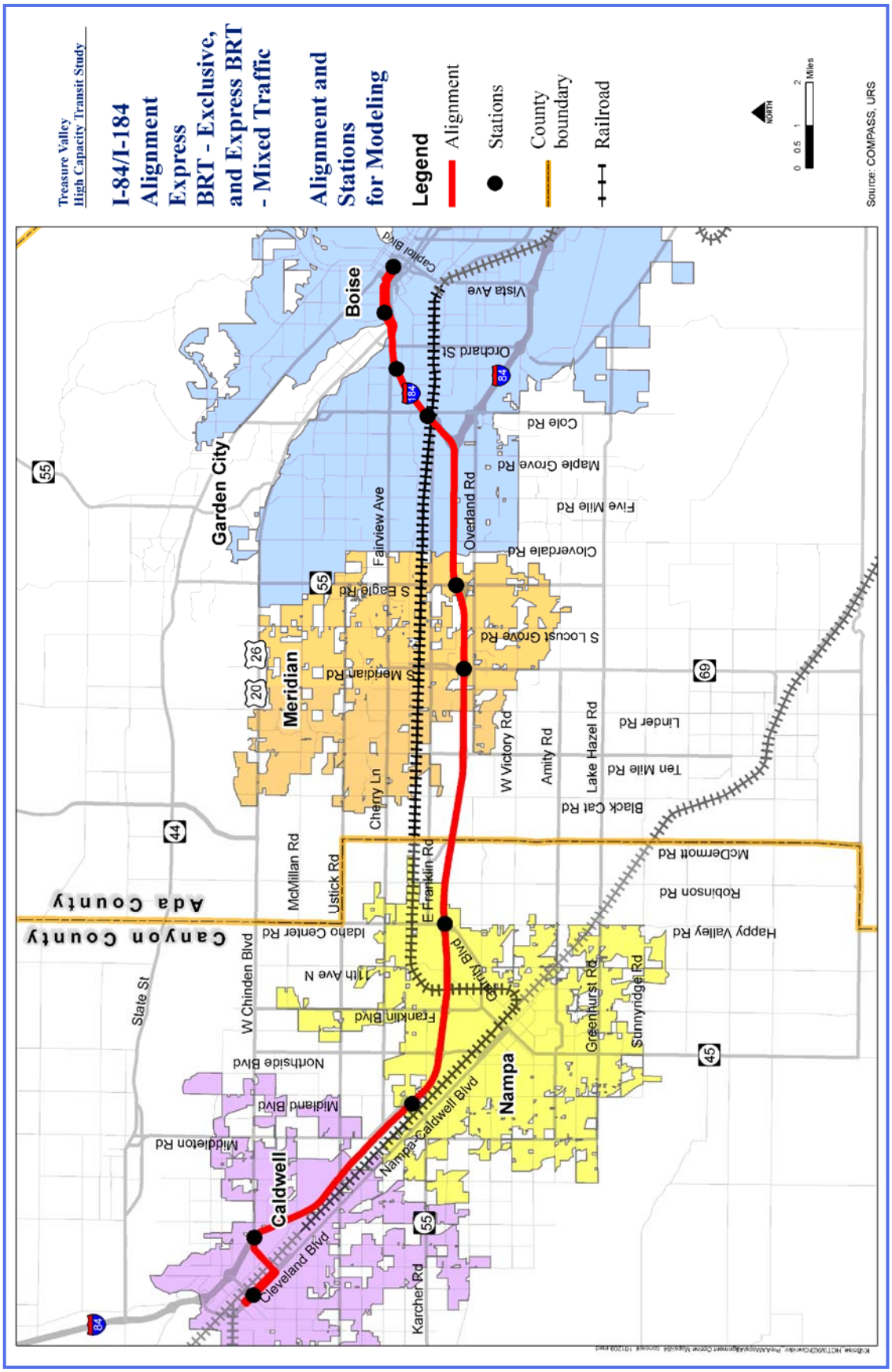


Figure 5-6: I-84/I-184
BRT - Exclusive and BRT - Mixed Traffic Concepts

6.0 Evaluation of Alternatives

The project team and the RTAC subgroup developed goals and objectives to use in measuring the performance of each of the alternatives. The following lists the goals and objectives.

Goal 1: Improve Transit Connectivity
- Objective 1.1: Connect major city central business districts.
- Objective 1.2: Connect residential areas with major employment centers.
- Objective 1.3: Connect residential areas with major activity centers.

Goal 2: Improve Transit Mobility
- Objective 2.1: Provide dedicated transit right-of-way where possible
- Objective 2.2: Provide good transit transfer opportunities with planned future bus system.
- Objective 2.3: Minimize transit travel time between major origins/destinations.

Goal 3: Manage Travel Demand
- Objective 3.1: Improve transit mode share.
- Objective 3.2: Provide service with good access for walk and bike.
- Objective 3.3: Provide potential park-and-ride sites with good auto access.
- Objective 3.4: Minimize impacts to traffic operations.

Goal 4: Support Transportation and Land Use Plans
- Objective 4.1: Provide transit improvements that are consistent with adopted local, state, and regional plans.
- Objective 4.2: Provide opportunities for transit-oriented development.

Goal 5: Financial Feasibility
- Objective 5.1: Develop high-capacity transit concepts that have the potential to be funded using a mix of federal, state, and local funds.
- Objective 5.2: Develop cost-effective high-capacity transit concepts.

For each objective, one or more measures were developed to assess how well each of the alternatives met each objective. The project team gathered information on the performance of each alternative relative to each measure in a *technical matrix* and assigned each alternative a score for each

measure. Each objective was also assigned a weighting by the RTAC subgroup.

6.1 Technical Analysis

This section discusses the measures used to evaluate each objective and the methodology used to assign rankings to each of the alternatives.

Objective 1.1: Connect major city central business districts (CBDs)

Objectives 1.1, 1.2, and 1.3 relate to the Major Activity Centers identified by COMPASS as part of the Communities in Motion process[4]. Further discussion of Major Activity Centers is provided in *Major CBDs, Employment, and Activity Centers*. Categories of major activity centers include the following:

- Main Activity Centers: Central business districts, Boise State University, Boise Airport, and regional medical centers.
- Employment Activity Centers: Employment areas with a density of 5 employees per acre or more.
- Commercial Activity Centers: 500,000 square feet of commercial area within a ¼ mile radius.

Measure: Number of major city CBDs with direct HCT connection

The measure for Objective 1.1 was simply the number of CBDs that would be served by the HCT alignment. There are four total CBDs within the study area to be served: Boise, Meridian, Nampa, and Caldwell.

Key findings:

- The Fairview Avenue/Cherry Lane and Franklin Road alignments would connect directly to all four CBDs.
- The Boise Cutoff Light Rail and BRT - Exclusive alignment would connect directly to all four CBDs.
- The Boise Cutoff Commuter Rail alignment would connect directly to three of the four CBDs, but would require a transfer to a bus to connect to downtown Boise.
- The Overland Road alignment would not connect directly to downtown Meridian and would require out-of-direction travel to reach downtown Boise.
- The I-84/I-184 alignment would not directly connect to downtown Nampa or downtown Meridian.

[4] http://www.compassidaho.org/prodserv/mac_gisdata.htm

Objective 1.2: Connect residential areas with major employment centers

Measure: Number of major employment centers served with HCT

The measure for Objective 1.2 was the number of Employment Activity Centers defined in Communities in Motion that would be served by the HCT alignment.

Key findings:

- The Boise Cutoff, Fairview Avenue/Cherry Lane, and Franklin Road alignments would serve five designated employment centers.
- The Overland Road and I-84/I-184 alignments would serve four designated employment centers.

Objective 1.3: Connect residential areas with major activity centers

Measure: Number of major activity centers served with alignment

The measure for Objective 1.3 was the number of Commercial Activity Centers and the number of Main Activity Centers other than CBDs that would be served by the HCT alignment.

Key findings:

- The Boise Cutoff, Franklin Road, and I-84/I-184 alignments would serve a relatively high number of designated main activity centers and commercial activity centers.
- The Fairview Avenue/Cherry Lane and Overland Road alignments would serve relatively few designated main activity centers and commercial activity centers.

Objective 2.1: Provide dedicated transit right-of-way where possible

Measure: Proportion of the alignment that would require additional right-of-way for HCT

Transit travel times and reliability can be significantly improved if a dedicated lane or running way is provided for a transit route. Existing and planned right-of-way widths along each alignment were examined to determine the relative ability of each alignment to accommodate the additional width required to provide a dedicated running way for Light Rail or BRT - Exclusive. The result was an approximate proportion of

each alignment that would require additional right-of-way in order to add an exclusive transit running way.

The right-of-way assessment was based on the existing right-of-way width and the existing roadway cross-sections, except for roadways that have planned widening projects included either in COMPASS's Financially Constrained Project List or the ACHD, *Draft Livable Street Design Guide*, April 2009.[5]

For Ada County roadways with planned widening projects, the right-of-way widths and cross-sections were assumed based on the ACHD, *Draft Livable Street Design Guide*. The guide specifies cross-section widths for each type of arterial roadway planned for in Ada County. Canyon County does not have a similar cross-section typology, and as such, the same (ACHD) cross-sections were assumed on roadways in Canyon County where widening is planned. Further detail on the methodology used can be found in *Objective 2.1 Evaluation Methodology*.

Key findings:

- No additional right-of-way would be required for BRT - Mixed Traffic except some short sections where queue bypass lanes may be added.
- No additional right-of-way would be required for Commuter Rail on the Boise Cutoff because it would operate on existing tracks. Further study would be required to determine whether additional right-of-way would be required to run adjacent to the UPRR main line from Nampa to Caldwell.
- A relatively high proportion of the length of the Fairview Avenue/Cherry Lane and Overland Road alignments would require additional right-of-way to add exclusive HCT lanes for Light Rail or BRT - Exclusive.
- A relatively low proportion of the length of the Franklin Road alignment would require additional right-of-way to add exclusive HCT lanes for Light Rail or BRT - Exclusive. This is primarily because Franklin is classified in the *Draft Livable Street Design Guide* as a Commercial Arterial, which would include parking. This analysis assumed that exclusive transit could be accommodated by removing parking. Therefore, these sections of roadway would not require additional right-of-way.
- A relatively low proportion of the length of the Boise Cutoff alignment would require additional right-of-way to add exclusive HCT lanes for Light Rail or BRT - Exclusive, due to a wide existing right-of-way

[5] http://www.achd.ada.id.us/PDF/TLIP_cities_discussion_draft/042709.pdf

- The I-84/I-184 alignment would require additional right-of-way for nearly the entire length of the alignment if a lane were to be added for exclusive BRT.

Objective 2.2: Provide good transit transfer opportunities with planned future bus system

Two related measures were used to evaluate Objective 2.2:

Measure: Number of locations where the HCT alignment would connect with one bus route

Measure: Number of locations where the HCT alignment would connect with two or more bus routes

This measure evaluated the number of locations where transfers could be made between the HCT line and local buses. This was measured using a 2035 future year bus network that was developed jointly by Valley Regional Transit and COMPASS and included in the regional travel demand model. The number of bus routes that would directly connect at each HCT stop were counted and used as a general indication of transit connectivity for each HCT alignment. If an HCT line is developed in the future, other local transit routes could be restructured to connect with the HCT line. This measure simply provides a general indication of the ability of each HCT alternative to connect with other bus routes.

Key findings:

- The arterial alignments would have a relatively high number of locations where transfers to local bus routes are possible, while the Boise Cutoff and I-84/I-184 alignments would have relatively few locations where transfers to local bus routes are possible. This is due to the number of stations on each of these alignment concepts.

Objective 2.3: Minimize transit travel time between major origins/destinations

Measure: 2035 transit travel times along HCT alignments (Caldwell to Boise Multimodal Center)

Transit travel times across the entire length of each alignment were used to evaluate the performance of each alternative against this objective. Data from COMPASS' regional travel demand model with a forecast year of 2035 were used to estimate transit travel times.

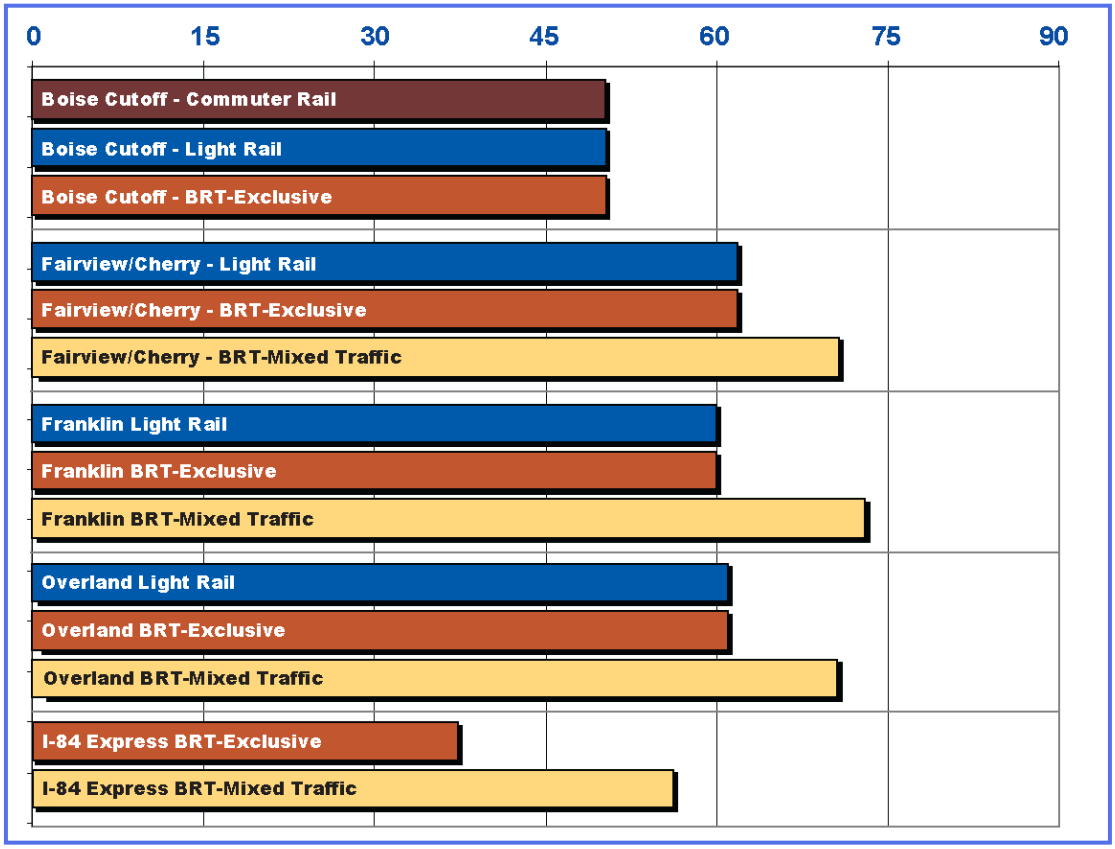
The route, service frequency, number of stations, and travel speeds were defined for each mode and alignment alternative. Travel speeds for exclusive running modes (BRT - Exclusive, LRT, and Commuter Rail) were based on posted speeds, acceleration/deceleration of the HCT mode, number of stations, and dwell time at stations. Travel speeds for mixed traffic BRT modes were based on these same factors, but reduced by a factor equal to the ratio of congested speeds to posted speeds in 2035. The model results include total travel times for each mode and alignment alternative based on these factors.

Measure: Transit Travel Time Reliability.

Research has shown that good transit travel times are important to attracting choice riders to use HCT service. In addition to good travel times, travel time reliability is equally important. The transit travel time reliability measure gives a higher score to alternatives that would operate in an exclusive right-of-way and, therefore, would be able to maintain a reliable schedule, and a lower score to alternatives that would operate in mixed traffic and be subject to traffic congestion.

Figure 6-1 shows the relative in-vehicle transit travel times for each of the modeled alternatives.

Figure 6-1: 2035 HCT In-Vehicle Transit Travel Times by Alternative (minutes)
Caldwell to Downtown Boise Multimodal Center



Key findings:

- The Boise Cutoff alternatives would have among the fastest in-vehicle transit travel times, with 51 minutes from Caldwell to the Boise multimodal center. Commuter Rail has fewer stations than the other Boise Cutoff HCT alternatives and it provides a relatively fast travel time between Caldwell and the Boise Depot (41 minutes). However, in order to provide a connection to the multimodal center, the Commuter Rail alternative requires a transfer to a bus at the Boise Depot. The added transfer time and travel time on the bus results in a total travel time similar to the Boise Cutoff Light Rail and BRT - Exclusive alternatives.
- Travel times for the Light Rail and BRT - Exclusive alternatives on all three arterial alignments are similar, ranging from 60 to 62 minutes.
- Travel times for BRT - Mixed Traffic alternatives on the arterial alignments are also similar, ranging from 71 to 73 minutes.
- BRT on I-84/I-184 with fewer stops and higher speeds would have a shorter travel time than the arterial alignments. BRT - Exclusive on I-84/I-184 had the

shortest travel time of all of the alternatives at 37 minutes. Travel time for BRT - Mixed Traffic on I-84/I-184 was 57 minutes.

- Commuter Rail, Light Rail, and BRT - Exclusive alternatives would have high schedule reliability. BRT - Mixed Traffic alternatives would have low schedule reliability.

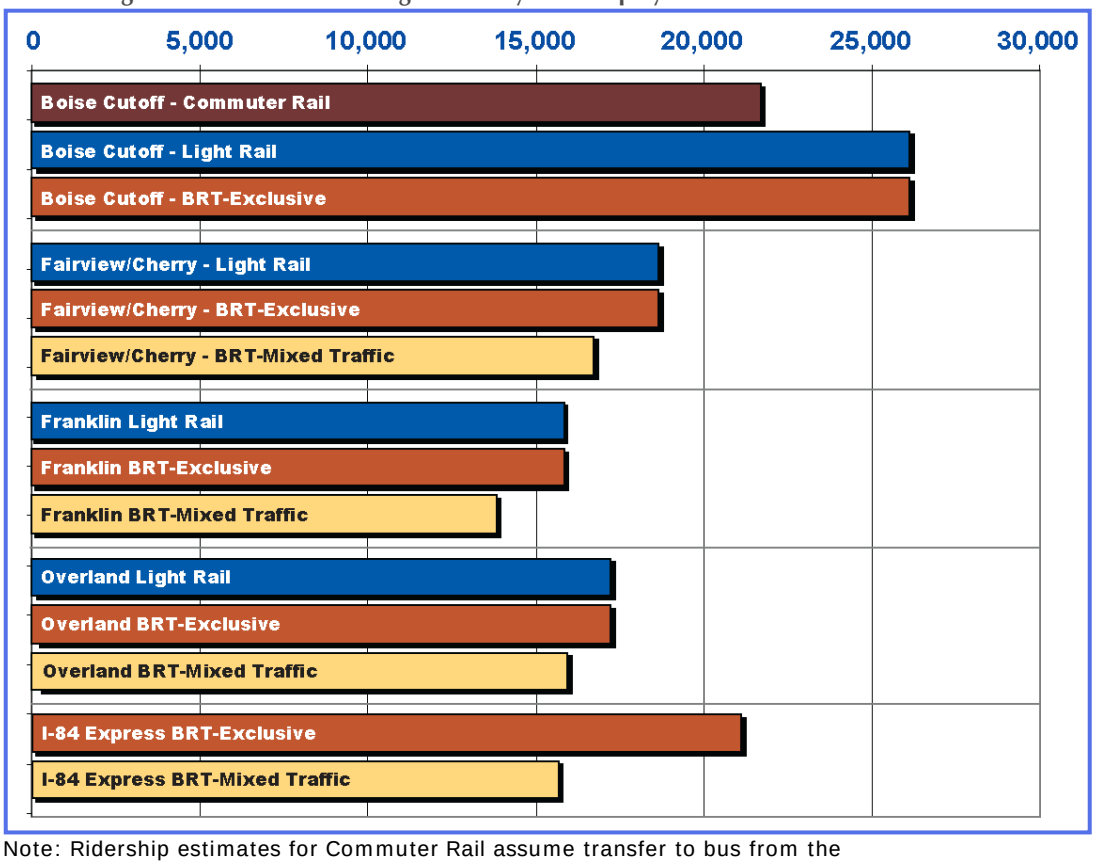
Objective 3.1: Improve transit mode share

Measure: Daily boarding rides on HCT mode

Objective 3.1 was measured using the COMPASS travel demand model. Each alternative was modeled for the year 2035. This measure indicates the number of boardings that are forecast with each HCT alternative on an average weekday, based on its transit travel time, connections to regional destinations, and station locations.

Figure 6-2 shows the projected average daily ridership for 2035 for each modeled alternative.

Figure 6-2: 2035 HCT Average Weekday Ridership by Alternative



Note: Ridership estimates for Commuter Rail assume transfer to bus from the Boise Depot to downtown Boise

Key findings:

- The Boise Cutoff alternatives and the I-84/I-184 BRT - Exclusive would have the fastest travel times and would result in the highest ridership potential.
- Fairview/Cherry has the highest ridership potential among the three arterial alignments.
- BRT - Mixed Traffic, due to slower travel times, has lower ridership potential than the alternatives with exclusive guideway operations.

Objective 3.2: Provide service with good access for walk and bike

Objective 3.2 was measured by evaluating the population and employment density that would be within walking distance of each alternative currently and in 2035 as well as a qualitative assessment of the quality of pedestrian and bicycle connections to the HCT route. The following three measures were used.

Measure: Existing and forecast year population and population density within 1/2 mile of alignment

This measure used demographic data from the *Communities in Motion* database to assess the total population and population density within ½ mile of the alignment for a 2008 base year and projected for 2035.

Measure: Existing and forecast year employment and employment density within 1/2 mile of alignment

This measure used demographic data from the *Communities in Motion* database to assess the total jobs and employment density within ½ mile of the alignment for a 2008 base year and projected for 2035.

Measure: Qualitative assessment of opportunities for and quality of walk and bike access

This measure was a qualitative evaluation of the presence and quality of pedestrian and bicycle facilities along each alignment. This included whether sidewalks and bicycle lanes exist or are planned and the level of interconnectedness of the street grid.

Table 6-1 shows the projected population and employment densities within one-half mile of each alignment in 2035. Note that there are two alignments on the Boise Cutoff. One is for the Commuter Rail to the Boise Depot. The other is for Light Rail and BRT - Exclusive running into downtown Boise. There are also two slightly different alignments for Franklin Road. BRT - Mixed Traffic is slightly different from Light Rail and

BRT - Exclusive because it uses Orchard Street while Light Rail and BRT - Exclusive use the Boise Branch railroad line.

Table 6-1: Projected 2035 Population and Employment Density

HCT Alignment	2035 Population per Acre	2035 Jobs per Acre
Boise Cutoff Commuter Rail	5.1	6.7
Boise Cutoff Light Rail/BRT-Exclusive	5.3	6.8
Fairview/Cherry Light Rail, BRT-Exclusive, BRT-Mixed Traffic	5.8	4.8
Franklin Light Rail, BRT-Exclusive	5.0	7.0
Franklin BRT-Mixed Traffic	5.1	6.8
Overland Light Rail, BRT-Exclusive, BRT-Mixed Traffic	5.0	5.5
I-84/I-184 Express BRT-Exclusive, Express BRT-Mixed Traffic	3.8	5.0

Key findings:

- The highest population density in 2035 is projected to be along the Fairview Avenue/Cherry Lane alignment.
- Due in part to a large portion of the area being devoted to freeway right-of-way, the I-84/I-184 alignment would have the lowest population density and second lowest employment density in 2035.
- Due in part to concentrations of industrial uses along the railroad alignment, the highest employment density in 2035 is projected to be along the Boise Cutoff and Franklin Road alignments.
- The Fairview Avenue/Cherry Lane alignment has a relatively low employment density due to the concentration of residential uses.
- The arterial alignments tend to have significant sections with sidewalks and bicycle lanes and generally have better pedestrian connectivity than the Boise Cutoff or I-84/I-184.
- If Light Rail or BRT - Exclusive were to be constructed along an arterial, the roadway reconstruction would likely include upgrades to sidewalks and bicycle lanes where they do not currently exist.

Objective 3.3: Provide potential park-and-ride sites with good auto access

Measure: Ability to site major park-and-ride facilities

At this level of analysis, it is not yet practical to select potential park-and-ride sites. For purposes of this analysis, a qualitative assessment was conducted of the relative ability of each alignment to accommodate park-and-rides at locations that meet the following criteria.

- Land availability. As a general rule of thumb, a surface parking lot can fit approximately 100 parking spaces in one acre.
- Direct connection to an HCT station with minimal walk distance to station.
- Proximity to regional highways. Park-and-rides should be sited relatively close to major regional arterials and highways in order to be convenient to access by travelers from a wide travel shed.
- Ease of access from regional highways and arterials. Park-and-rides need to be sited at locations that are both convenient to regional highway interchanges and not overly congested.

Key findings:

- The Boise Cutoff, Franklin Road, Overland Road, and I-84/I-184 alignments are the most readily accessible from I-84.
- There are a relatively large number of vacant parcels currently available along the Boise Cutoff and Franklin Road alignments.
- The Boise Cutoff, Fairview Avenue/Cherry Lane, and Franklin Road alignments may have opportunities for shared park-and-ride lots with major existing facilities that have large, existing and underutilized parking lots. These shared-use opportunities could be considered at Boise Towne Square Mall, the Idaho Center, and the College of Western Idaho.
- Siting park-and-rides with good walk access to HCT stations would be challenging along I-84 due to the need to cross to the other side of the freeway in interchange areas.

Objective 3.4: Minimize impacts to traffic operations

Measure: Potential impact of HCT concept on traffic operations and major signalized intersections

An initial planning-level assessment of the potential traffic impacts of each HCT alternative was prepared. The traffic evaluation used available information on existing traffic operations in the corridor (number of driveways, signalized intersections, congested areas, etc.) and noted any key issues that could be associated with any of the HCT alternatives.

Key findings:

- BRT - Mixed Traffic could degrade adjacent traffic operations compared with BRT -Exclusive due to buses weaving and merging to serve designated transit stations.
- Light Rail or BRT - Exclusive in a median along the Fairview Avenue/Cherry Lane, Franklin Road, or Overland Road alignment would restrict left-turn access to local streets and driveways.
- Franklin Road has fewer driveways and local street connections than Fairview Avenue/Cherry Lane or Overland Road.
- Restriction of left turns into and out of local streets and driveways along the arterial alignments would increase traffic volumes making left or u-turns at major signalized intersections.
- Alternatives on the Boise Cutoff alignment would have less direct traffic conflict than the arterial alignments, but would have potential queuing and delay problems where railroad crossings are in close proximity to other busy intersections.
- Modifications to interchange ramps to give priority to BRT buses on the I-84/I-184 alignment could impact cross traffic and traffic entering or exiting the freeway.

Objective 4.1: Provide transit improvements that are consistent with adopted local, state, and regional plans

Measure: HCT improvements identified in local, state, and regional plans

Objective 4.1 was measured by reviewing local, state, and regional plans and noting whether they mention high-capacity transit for any specific alignments or modes.

Key findings:

- The Boise Cutoff alignment is specifically mentioned in multiple plans as a potential commuter rail or light rail corridor.

- Plans for future transit service improvements on the Fairview Avenue/Cherry Lane alignment are mentioned in *Communities in Motion*.
- The Franklin Road alignment is noted as a potential express bus route in *Communities in Motion*.
- *Communities in Motion's* recommendations for the I-84 corridor include studying corridor level operational improvements, such as high-occupancy vehicle lanes, ramp metering, expansion/enhancement of bus operations, and a fixed guideway transit system.
- The Overland Road alignment is noted as a primary bus route in multiple plans.
- HCT on any of the alignments would be supportive of broad comprehensive plan goals for improved transit service.

Objective 4.2: Provide opportunities for transit-oriented development

Measure: Mode and alignment support transit-oriented development

Objective 4.2 was measured qualitatively. Different modes and different types of alignments have the potential to support increased development intensity at different levels.

Investments in rail transit infrastructure tend to support an increased intensity of land use. With transit investments, the degree to which developers respond and build more intensively is often correlated to the level of investment in transit infrastructure. The more permanent the transit infrastructure is, the more likely it is to result in higher intensity development.

The ability of a transit line to influence development also depends on the accessibility of the transit line from adjacent land uses. Arterial alignments tend to have the highest accessibility from adjacent land, while railroad and freeway alignments would have lower accessibility from adjacent land due to the broad width of the right-of-way and limited crossings.

Key findings:

- Light Rail on the arterial alignments would be highly supportive of TOD opportunities.
- BRT - Exclusive on arterial alignment would be moderately supportive of TOD opportunities.
- BRT - Mixed Traffic on arterial alignments would offer little support for TOD opportunities.

- Any modes along the Boise Cutoff alignment would be moderately supportive of TOD opportunities. Investment in transit infrastructure would support TOD, but the limited access nature of the alignment would tend to limit these opportunities.
- The I-84/I-184 alignment would offer little support for TOD opportunities due to the limited local access opportunities within the freeway interchange areas.

Objective 5.1: Develop high-capacity transit concepts that have the potential to be funded using a mix of federal, state, and local funds

Measure: Order-of-magnitude capital cost

Objective 5.1 was measured by estimating order-of-magnitude capital costs for each alternative. The order-of-magnitude capital cost estimates provide a general range of costs that can be used to compare among the HCT alternatives being considered during Phase 1. At this early planning stage, the HCT concepts are not being developed in any significant detail and as such ***the order-of-magnitude costs should be used only for comparison among the alternatives and to provide a very general sense of the magnitude of the potential costs associated with each alignment and mode alternative being considered.***

The order–of-magnitude capital cost ranges were estimated using a conceptual description of each HCT mode and alignment alternative and data on average cost per mile from a range of comparable HCT systems.

The average cost per mile was based on commuter rail, light rail, BRT - exclusive and BRT - mixed traffic projects completed in the United States in the past 10 to 15 years. A representative sample of recent projects that were most similar to the characteristics of the Treasure Valley (primarily western U.S. cities) was used as the basis for a representative cost per mile for each mode and alignment type included in this study. Specific costs such as right-of-way acquisition are not individually estimated, but are captured because the representative sample of recent projects include right-of-way acquisition. Further detail on the capital cost estimation methodology can be found in *Order of Magnitude Capital Cost Methodology*.

Measure: Estimated annual operations and maintenance cost

Operations and maintenance costs were also used to measure Objective 5.1. Operations and maintenance costs for each alternative were estimated by applying industry average costs per vehicle hour by mode to each alternative. The assessment included vehicle capacity, route run time, and number of vehicles required per hour of service.

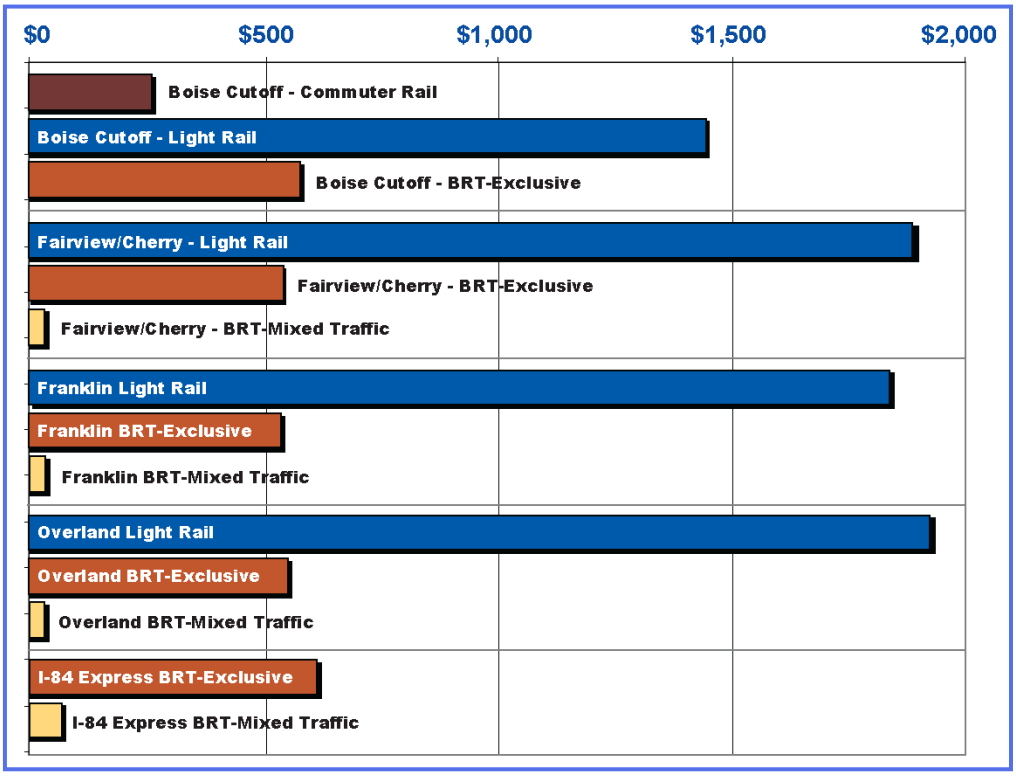
Two estimates of operations and maintenance costs were calculated. One is based on the 15-minute service frequencies for each mode that was modeled. Operations and maintenance costs at the modeled frequencies were higher for Light Rail and Commuter Rail than they were for the BRT alternatives.

Light rail and commuter rail, however, have considerably higher passenger capacity than the bus-based BRT alternatives due to the ability to operate multi-car trains. The second method for estimating operations and maintenance costs provides a more realistic evaluation by estimating the number of buses (and light rail and commuter rail trains) that would be required to accommodate 1,000 passengers per hour.

In future phases of the AA, the frequency of service will be equilibrated in the model to determine the best service frequency for each mode. Operations and maintenance costs will then be calculated based on the ideal frequency for each alternative. Further detail on the methodology used to estimate operations and maintenance costs can be found in *Operating and Maintenance Cost Estimate*.

Figure 6-3 shows the relative order-of-magnitude capital cost for each alternative.

Figure 6-3: Order-of-Magnitude HCT Capital Cost by Alternative (in millions)

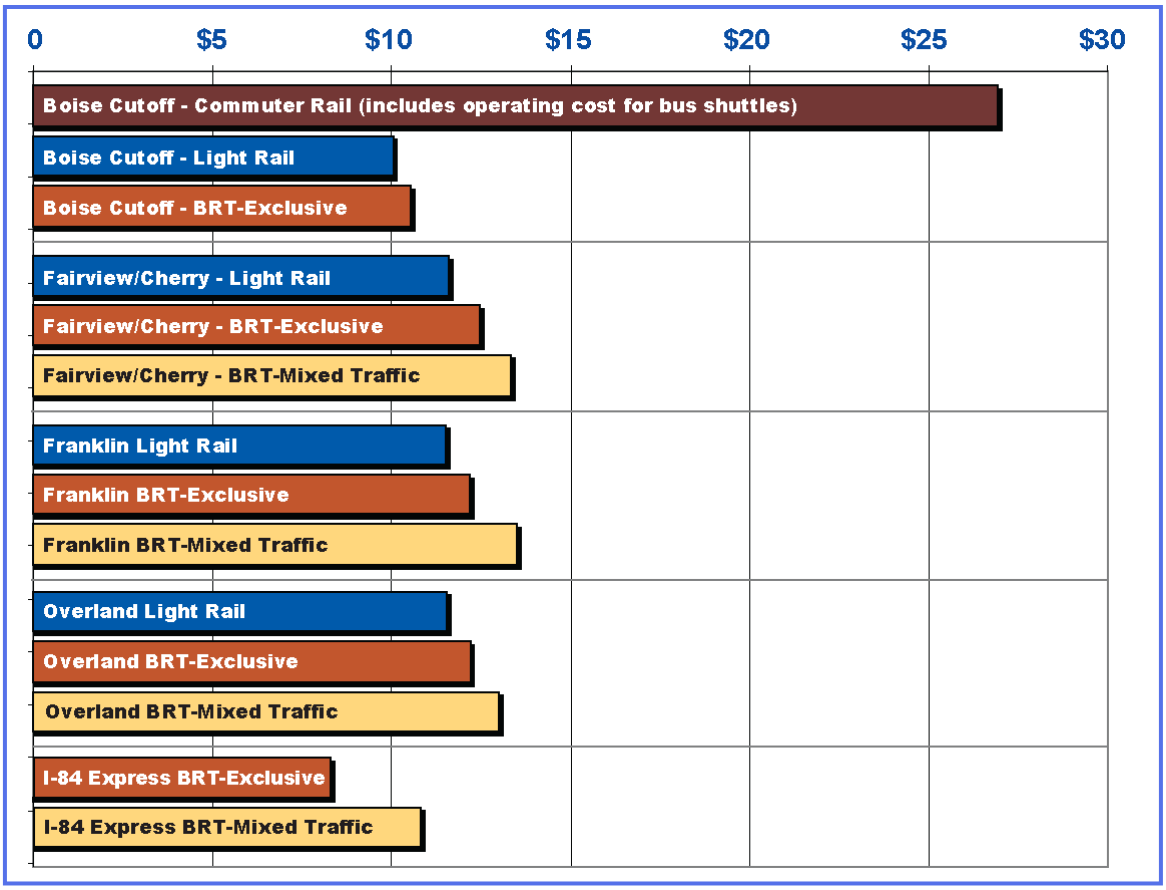


Key findings:

- Light Rail would be the most expensive mode to implement.
- BRT - Mixed Traffic, which includes only minor capital improvements would be significantly less expensive to implement than any of the other modes.
- Commuter Rail on the Boise Cutoff alignment could be implemented for less capital cost than the other exclusive guideway alternatives.

Figure 6-4 shows the relative operations and maintenance costs for each alternative based on operating frequencies that would provide the 1,000 passenger capacity per hour for each mode.

Figure 6-4: HCT Annual Operations and Maintenance Cost by Alternative
(based on constant capacity of 1,000 spaces per hour for all modes)
(in millions)



Key findings:

- Commuter Rail typically requires a train operator and conductor and as a result would have higher annual operations and maintenance costs than the other modes.
- I-84/I-184 BRT - Exclusive could have a lower annual operations and maintenance costs than other bus modes due to its short travel times, resulting in fewer vehicles needed per hour.
- All other alternatives have relatively comparable annual operations and maintenance costs.

Objective 5.2: Develop cost-effective high-capacity transit concepts

Objective 5.2 assesses the cost-effectiveness of each alternative by dividing the estimated annualized order-of-magnitude capital cost and the estimated annual operations and maintenance costs by the annual number of riders estimated by the model. In addition, a qualitative measure relating to the expandability of each alternative was included. This captures the advantage that rail modes have in being

able to add additional capacity by coupling cars together without having to operate additional vehicles with additional drivers. The following three measures were used.

Measure: Annualized capital cost per HCT rider

This measure was evaluated by applying industry standard annualization factors to the order-of-magnitude capital cost and the estimated daily HCT ridership from the model and dividing the annualized capital cost by the annual riders.

Measure: Operating cost per HCT rider

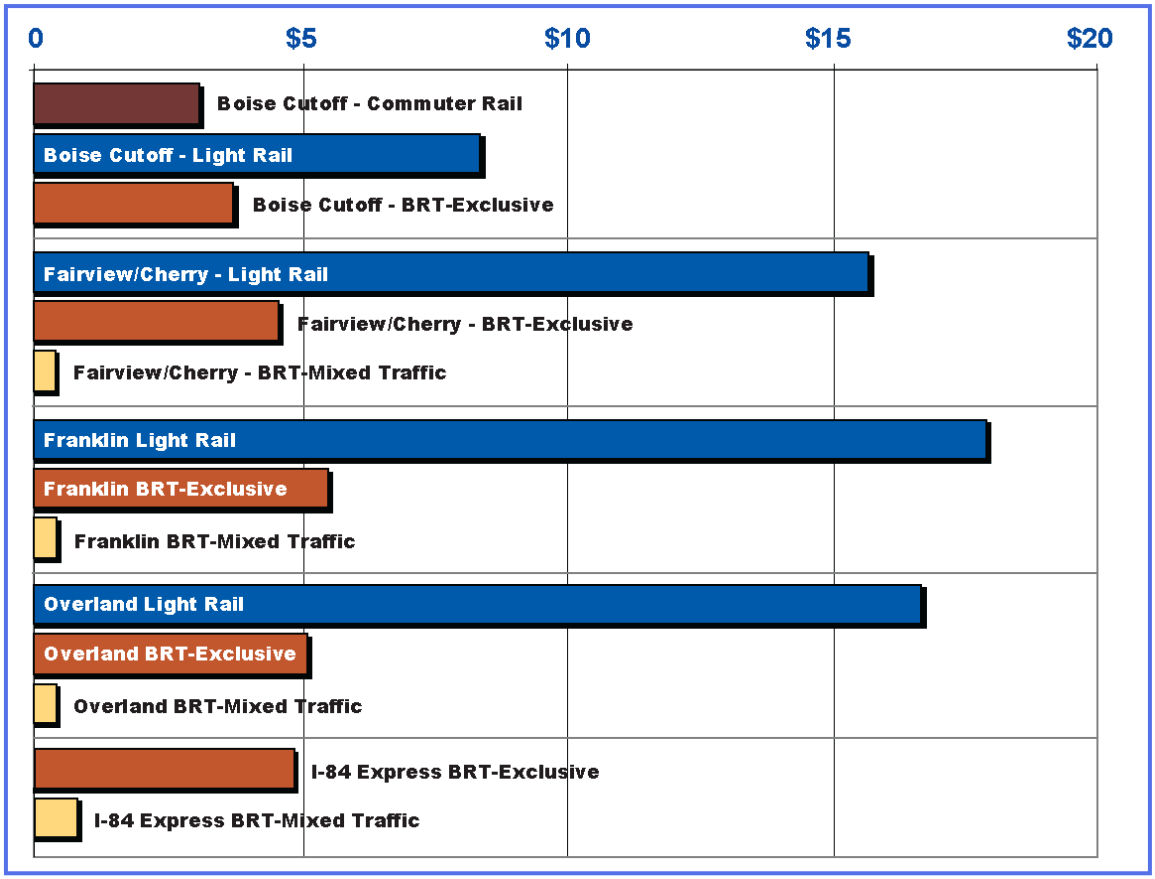
This measure was evaluated by dividing the annual operating cost by the annual riders.

Measure: Readily Expandable

This measure captures the advantage of rail modes of being expandable by coupling cars together, without requiring an additional driver. In addition, BRT in an exclusive lane is somewhat more readily expandable than BRT in mixed traffic because the shorter travel times attainable with an exclusive lane reduce the number of vehicles required to provide the same frequency and, therefore, increase the flexibility to add vehicles.

At this early stage of analysis, working with planning-level estimates of ridership and costs, the actual dollar amounts are not as important as the relationship among the alternatives. Figure 6-5 shows the relative differences among the alternatives in annualized capital cost per HCT rider.

Figure 6-5: Annualized Order-of-Magnitude HCT Capital Cost Per Annual HCT Rider by Alternative

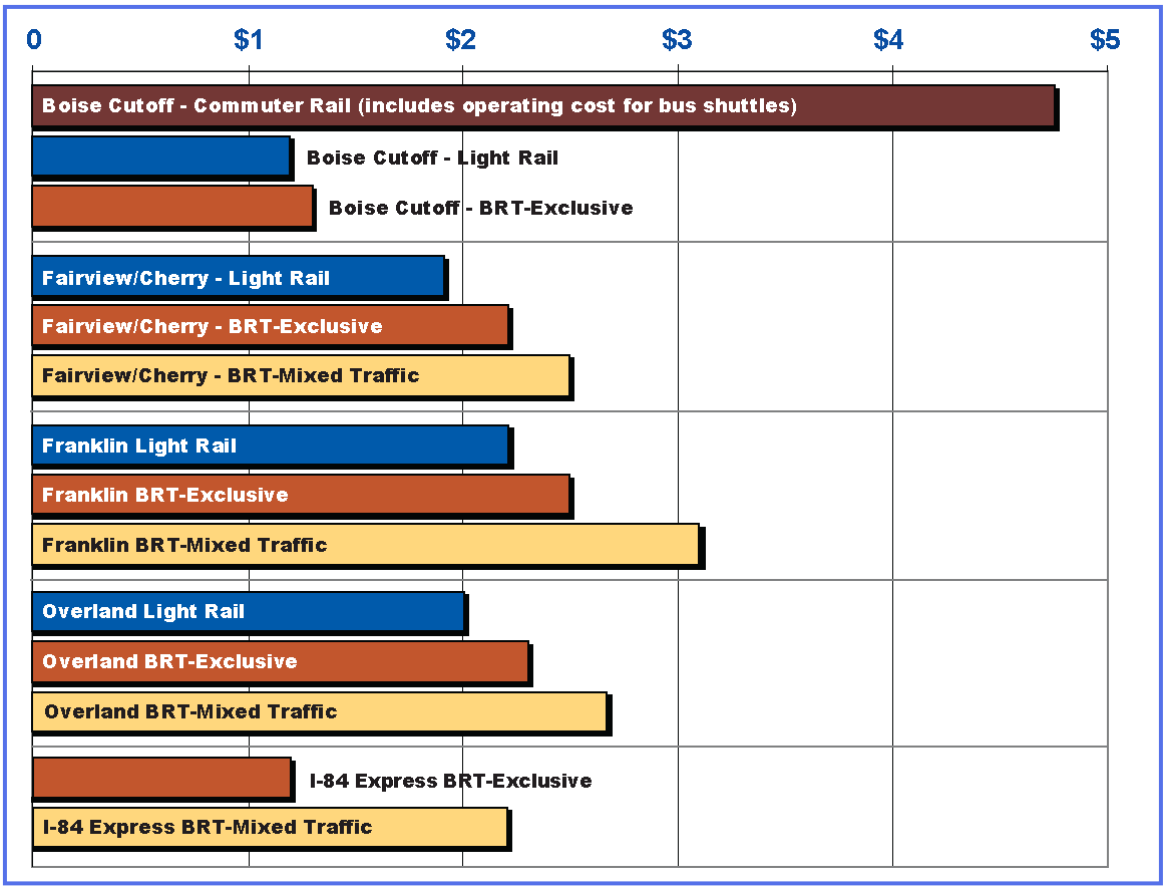


Key findings:

- Due to its high capital cost Light Rail on the arterial alignments would have the highest annualized capital cost per rider. Light Rail on the Boise Cutoff alignment has a slightly lower capital cost per rider due to having higher annual rideship than the other light rail options.
- BRT - Mixed Traffic would have much lower capital cost than the exclusive guideway alternatives resulting in the lowest annualized capital cost per rider.
- BRT - Exclusive would have similar annualized capital cost per rider on any alignment.
- Commuter Rail on the Boise Cutoff would have similar annualized capital cost per rider to BRT - Exclusive.

Figure 6-6 shows the annual operations and maintenance costs per HCT rider for each alternative. As before, this is based on operating frequencies that would provide the same passenger capacity per hour for each mode.

Figure 6-6: HCT Annual Operations and Maintenance Cost Per Annual HCT Rider by Alternative (based on constant capacity of 1,000 spaces per hour for all modes)



Key findings:

- Light Rail would generally be less expensive to operate per rider due to the ability to carry significantly more riders per driver than the bus modes.
- BRT - Exclusive would have a lower operations and maintenance cost per rider than BRT - Mixed Traffic due to higher ridership and faster travel times, which result in fewer vehicles needed per service hour.
- Light Rail and BRT - Exclusive on the Boise Cutoff would be less costly per rider than those same modes on other alignments due to high ridership.
- Commuter Rail on the Boise Cutoff would be the most expensive per rider to operate due to the requirement for two person crews on the Commuter Rail trains and the need to operate buses from Boise Depot to the multimodal center.

Finally, expandability was evaluated qualitatively.

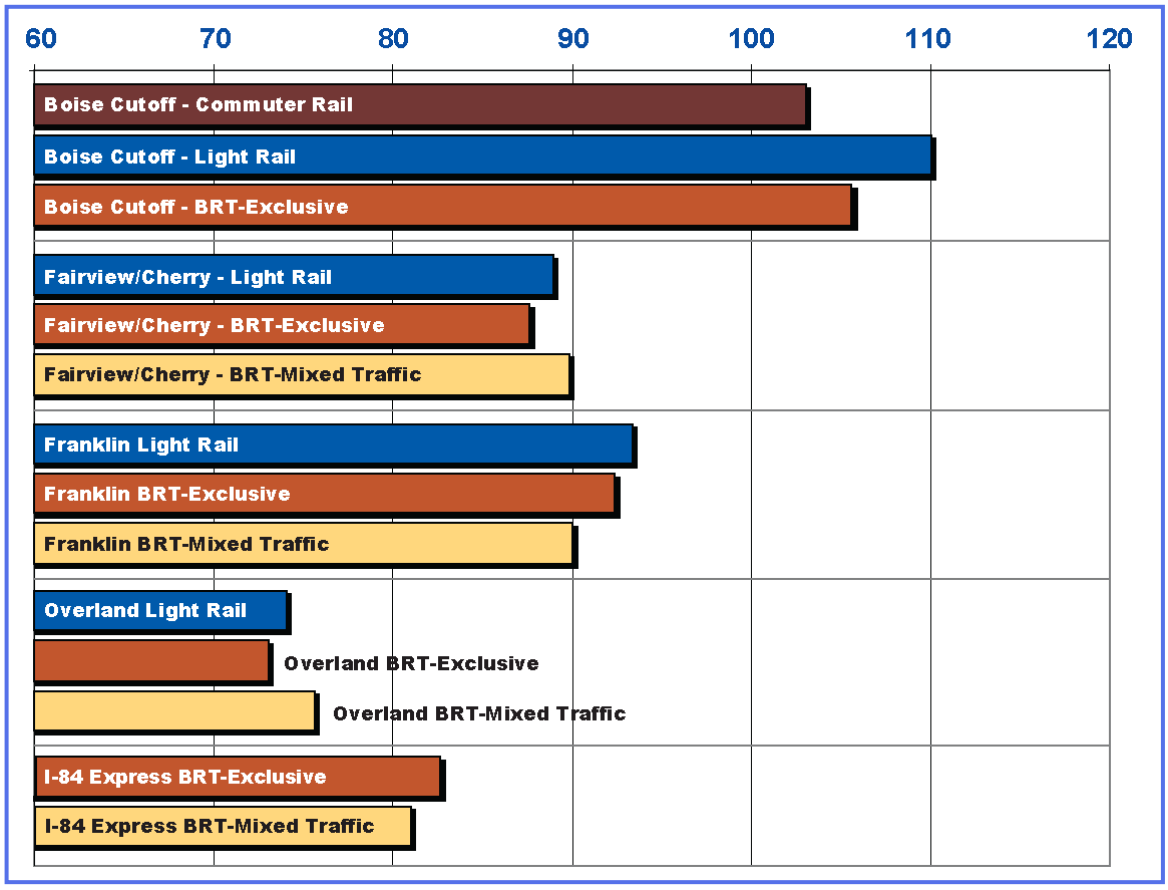
Key findings:

- Light Rail on any of the alignments would be readily expandable by coupling cars together.
- BRT - Exclusive is somewhat readily expandable due to relatively short travel times allowing for greater flexibility in adding vehicles.
- Commuter Rail would be readily expandable by coupling cars together, however this expandability would tend to be lessened by the need for additional staff.

6.2 Evaluation Summary

Each of the above objectives was ranked from 1 – 5 based on the relative performance of each alternative. A weighting value of up to 3 was then applied to each objective. The technical rankings and weighting factors were agreed upon by the RTAC subgroup. The total weighted scores for each objective were added up to provide a total score for each alternative. These total scores are shown in Figure 6-7.

Figure 6-7: Total Weighted Scores for each Alternative



The total scores give an indication of the relative performance of each alternative. It was not the intent of the technical analysis to provide the final determination of the most promising mode and alignment alternatives. However, the technical findings do provide an important foundation for understanding the strengths and weaknesses of the various alternatives for providing HCT service to the Treasure Valley.

The RTAC subgroup and the consultant team used the technical scoring as a guide in developing recommendations for the next steps to advance the study of HCT alternatives to serve the Treasure Valley.

7.0 Next Steps/Recommendations

The project consulting team (URS Corporation and Kittelson Associates) has extensive experience working on local transit and transportation projects and they have worked on FTA New Starts projects throughout the country. With this background and expertise, the consultants collaborated with the RTAC subgroup on the technical evaluation of the HCT alternatives. With input from the RTAC subgroup, the consultant team recommends the following HCT alternatives be considered for the detailed analysis in the next phase of the alternatives analysis.

- ***Boise Cutoff Commuter Rail***
- ***Boise Cutoff Light Rail***
- ***Boise Cutoff BRT - Exclusive***
- ***Fairview BRT - Exclusive***
- ***Franklin Light Rail***
- ***Franklin BRT - Exclusive***
- ***I-84 / I-184 BRT - Exclusive***

The HCT alternatives recommended for further analysis have indicated the potential to support local and regional plans for accommodating growth in the valley by providing effective alternatives to the single-occupant vehicle. While the initial analysis found these to be the most promising alternatives, a number of issues remain that will merit further assessment, including:

- Further exploration of exclusive guideway connections from the Boise Cutoff and Franklin Road to the downtown Boise multimodal center.
- Further exploration of routing feasibility for all modes between the cities of Nampa and Caldwell.
- Refinement of service options for providing a connection between Commuter Rail at the Boise Depot and the downtown Boise multimodal center.

- Detailed assessment of right-of-way needs.
- Detailed traffic analysis to understand the impacts associated with exclusive HCT operations in Franklin Road and Fairview Avenue.
- Examine the potential for phased implementation of HCT improvements.

Numerous other technical issues will be addressed through refined conceptual designs and detailed technical evaluation. These issues would include:

- More detailed traffic and operational analyses.
- Expanded impact analyses. (noise, land use, other environmental)
- Refined passenger estimates.
- Refined cost estimates.